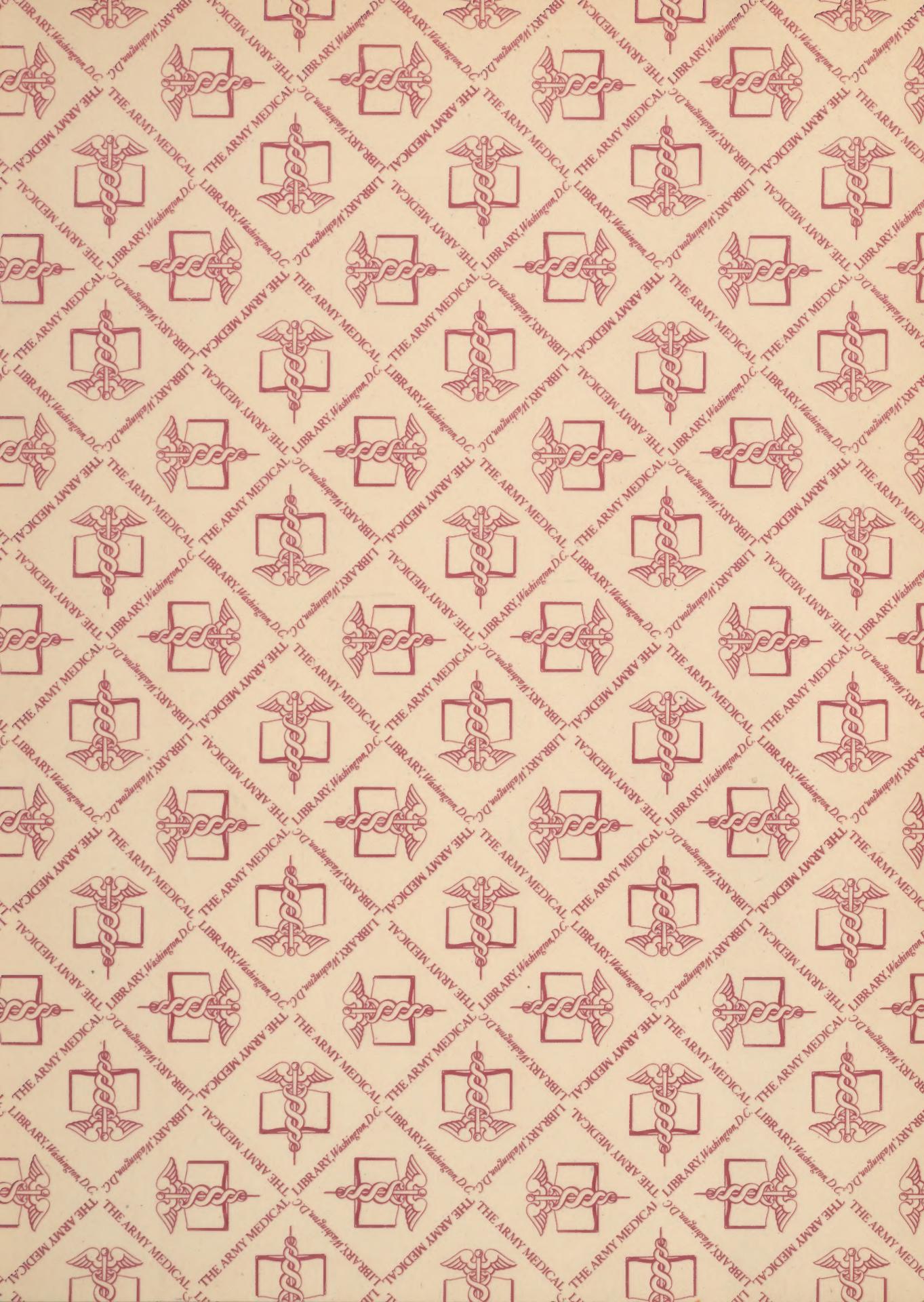


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Army
U.S. Surgeon General's Office

HISTORY OF PREVENTIVE MEDICINE

UNITED STATES ARMY FORCES, MIDDLE PACIFIC

Ex. 102

This report is being made available pending the completion of the official History of the Medical Department in World War II. Persons finding errors in facts or important omissions should communicate with the Historical Division, Army Medical Library, Washington 25, D.C.

It is emphasized that all statistical data in this historical report are tentative and subject to revision when tabulation of individual sick and wounded report cards has been completed.

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Einzelne Beobachtungen mit Bezug auf die Atmung sind
nur selten möglich, so dass die Ergebnisse nicht allzu
durchaus zuverlässige sind. Eine ähnliche Tendenz zu
einem starken Anstieg der Atmung ist mit der Zufuhr von
etwa 200 ml Jodwasser zu beobachten, während die Atmung
nach Zufuhr von 100 ml Jodwasser nicht signifikant erhöht ist.

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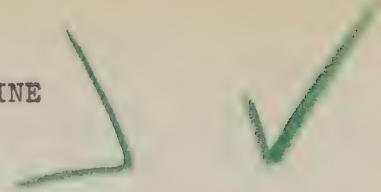
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SECTION 1

PREVENTIVE MEDICINE IN THE MIDDLE PACIFIC

PREVENTIVE MEDICINE
in the
MIDDLE PACIFIC



When the United States Army Forces, Pacific Ocean Areas, was organized 1 August 1944, a Colonel, MC, was placed in charge of certain aspects of Preventive Medicine in addition to his duties as Medical Consultant.

At the same time, an officer was assigned to investigating and recommending corrective measures in the fields of epidemiology and sanitation in addition to his duties as commanding officer of the 18th Medical General Laboratory.

On 24 August 1944 the Office of The Surgeon General in letter, subject: "Essential Technical Medical Data," (Annex 1) sent to this headquarters a request for a list of officers assigned in various positions in the Headquarters United States Army Forces, Pacific Ocean Areas, the headquarters of various base commands and other major echelons in the area.

The Essential Technical Medical Data report for the month of September 1944 (Annex 2) from United States Army Forces, Pacific Ocean Areas, indicated to the Office of The Surgeon General, that Colonel DeCoursey was in charge of Epidemiology and Sanitation.

As it was known in the Preventive Medicine Service, Office of The Surgeon General, United States Army, that Colonel DeCoursey was Commanding Officer of the 18th Medical General Laboratory and because it was felt that a full time Preventive Medicine group should be established in the Office of the Surgeon, United States Army Forces, Pacific Ocean Areas, the Preventive Medicine Service recommended to the Operations Service of the Office of The Surgeon General, that an officer be ordered to the Pacific Ocean Areas for duty in the Surgeon's Office as the Chief of Preventive Medicine.

In late August 1944 the Surgeon, Pacific Ocean Areas, was in Washington, and conferences were held regarding the assignment of Preventive Medicine personnel to the Surgeon's Office, United States Army Forces, Pacific Ocean Areas.

In November 1944 Assistant Chief of Staff, G-5, Pacific Ocean Areas, recommended to the Chief, Pacific Theater Section, that an officer qualified to be the Chief of the Preventive Medicine Section on the staff of the Surgeon, Pacific Ocean Areas and an officer qualified as Malariaologist on the same staff be assigned as soon as practicable (Annex 3).

On 2 November 1944, the Chief of the Pacific Section Theater group, Operations Division of the War Department General Staff, addressed a

memorandum to The Surgeon General's Office, concurring in the memorandum of 1 November and requesting the names of the officers required (Annex 4).

On 3 November 1944, Brigadier General S. Bayne-Jones, the Acting Chief, Preventive Medicine Service, Office of The Surgeon General, recommended the assignment of Lieutenant Colonel Thomas G. Ward as the Chief of the Preventive Medicine Staff of the Surgeon, Pacific Ocean Areas. This memorandum also recommended the assignment of Lieutenant Colonel Paul A. Harper, MC, -436882, who at that time was assigned as the Malariologist in the South Pacific Base Command, APO 709 (Annex 5). Accordingly Lieutenant Colonel Ward departed Washington, D.C., 17 November 1944, and arrived at Oahu, 19 November 1944. He was appointed the Chief, Preventive Medicine Branch, Office of the Surgeon, United States Army Forces, Pacific Ocean Areas, 20 November 1944, by verbal order Brigadier General John M. Willis, Surgeon.

On 24 November 1944, a memorandum, subject: "Preventive Medicine Program for the Pacific Ocean Areas," was presented to the Surgeon, United States Army Forces, Pacific Ocean Areas. This program was really an outline of the functions of the Preventive Medicine Branch and was based on Army Regulations, War Department Circulars and other Army publications. This memorandum (Annex 6) recommended the assignment of nine (9) officers and fifteen (15) enlisted personnel. It further stated that a Malariologist and a Sanitary Engineer should be assigned at the earliest possible time.

On 28 November 1944 a radiogram (Annex 7) was dispatched to the South Pacific Base Command requesting that Lieutenant Colonel Harper report to this headquarters on temporary duty. Lieutenant Colonel Harper arrived in December and was detailed as Malariologist in the Preventive Medicine Branch, Surgeon's Office, United States Army Forces, Pacific Ocean Areas.

Shortly thereafter in December 1944, Lieutenant Colonel Ward departed on a trip to the South Pacific Base Command and Western Pacific Base Command for the purpose of assisting the Chemical Warfare Officer in Bacteriological Warfare Defense measures. After covering these areas, the trip was terminated 1 January 1945 by return to Oahu. A copy of the report covering this inspection is attached hereto as Annex 8.

ANNEXES

1. Letter to CG, CPBC, attn Surgeon from SGO, subj "Essential Technical Medical Data (ETMD)," 24 Aug 44.
2. Letter to TAG, attn Surgeon Gen from CG, USAFPOA, subj "ETMD from Overseas Forces," 20 Sep 44.
3. Memo for Col Johnson, Chief, Pacific Theater Sec, OPD, from Col John Kelihier, CGS, ACofS, G-5, POA, subj "Med Offs for Asgmt to POA," 1 Nov 44.
4. Memo for Lt Col B. C. Bevil, SGO, from Col H. C. Johnson, GSC, Chief, Pacific Sec Theater Gp, OPD, WDGS and Lt Col J. A. Seitz, CGS, subj "Med Off for Asgmt to POA," 2 Nov 44.
5. Memo for the Chief, Opr Sv, SGO, attn Lt Col L. C. Bevil from Brig Gen S. Bayne-Jones, USA, Actg Chief Preventive Med Sv, 3 Nov 44.
6. Memo to Surgeon, Hq USAFPOA, APO 958, from Thomas G. Ward, Lt Col, MC, 24 Nov 44.
7. Radio, Surgeon POA to ComGen SoPacBaCom, 28 Nov 44.
8. Letter to CG, USAFPOA, APO 958 from Thomas G. Ward, Lt Col, MC, and R. Beverly Caldwell, Maj, CWS, 3 Jan 45.

WAR DEPARTMENT
Army Service Forces
Office of The Surgeon General

SPMDD-01
SPMC 721.5

24 August 1944

SUBJECT: Essential Technical Medical Data.

TO : The Commanding General
Central Pacific Base Command
A.P.O. 958, c/o Postmaster
San Francisco, California
(Attention: The Surgeon)

* * *

6. Request your next report include a list of the names of officers filling the following positions. Please disregard those that do not exist in your theater, and if any key positions exist other than those listed, please name them and the officer occupying the same. For all entries add the length of time the officer has occupied that position.

* * *

Theater Chief of Preventive Medicine (or Medical Inspector) and the principal assistants in various specialties including venereal disease, sanitary engineering, malaria control, and nutrition.

Army Medical Inspector and principal assistants in the various specialties. Medical Inspectors of base commands, corps, and divisions.

* * *

For The Surgeon General:

A TRUE EXTRACT COPY:
s/ Charles D. Buss
CHARLES D. BUSS
1st Lt., SnC

R. W. BLISS,
Brigadier General, U.S.A.,
Chief, Operations Service.

HEADQUARTERS UNITED STATES ARMY FORCES, PACIFIC OCEAN AREAS
Office of The Commanding General
APO 958

In reply refer to:
(Surg 350.05)

20 September 1944

E X T R A C T

SUBJECT: Essential Technical Medical Data from Overseas Forces.

TO : The Adjutant General, U. S. Army, Washington 25, D. C.

ATTN : The Surgeon General, U. S. Army, Washington 25, D. C.

* * * * *

5. In reply to your query, paragraph 6, letter subject as above, 24 August 1944, the officers listed below occupy the positions indicated.

a. Surgeon's Office, Headquarters, USAFPOA.

* * * * *

Epidemiologist-Entomologist-Sanitation (Assigned to 18th Med Gen Lab) Col Elbert DeCoursey, MC 23 August 1944

* * * * *

For the Commanding General:

A TRUE EXTRACT COPY:

s/ Charles D. Buss
CHARLES D. BUSS
1st Lt, SnC

1 November 1944

MEMORANDUM FOR COLONEL JOHNSON, CHIEF, PACIFIC THEATER SECTION, OPD:

Subject: Medical Officers for Assignment to POA.

1. Discussion with General King indicates that certain specialized medical officers not available within POA can now be made available by the Surgeon General if a request is immediately made to them for these officers. It is requested that officers with the following qualifications and grades be made available and orders issued authorizing temporary duty in POA. It is desired that these officers be assigned to POA when position vacancies are made available.

a. One officer qualified to set up procedure for shipping whole blood to POA. General King states Lt. Colonel Kendrick, MC, is now available for this assignment and is well qualified. It is expected that this officer will also coordinate the necessary procedures arranging also for the shipment of whole blood to the Southwest Pacific Area. Officer should be available prior to 1 December 1944.

b. One Colonel, MC, qualified to be the Chief of the Preventive Medicine Section on the Staff of the Surgeon, POA.

c. One Colonel or Lt. Colonel, MC, qualified as Malariaologist for the Staff of the Surgeon, POA.

s/John Keliher
t/JOHN KELIHER
Colonel, GSC,
AC of S, G-5, POA

A TRUE COPY:

s/ Charles D. Buss
CHARLES D. BUSS
1st Lt., SnC

2 November 1944

Memorandum for Lt. Col. B. C. Bevil:

Room 1020, Office of The Surgeon General
1818 H Street, N.W.
Washington, D. C.

Subject: Medical Officers for Assignment to POA.

1. Reference my telephone conversation with you this morning concerning request contained in the attached memorandum from POA, subject: Medical Officers for Assignment to POA, dated 1 November 1944.

2. This Section concurs in the assignment of these officers as stated in attached memorandum, and upon advice of the names of the officers listed in paragraphs 1b and c, necessary action will be taken by OPD to initiate a request for orders for the individuals concerned.

3. Will you please advise me informally at your convenience on this matter?

s/H. C. Johnson
t/H. C. JOHNSON
Colonel, G. S. C.,
Chief, Pacific Section
Theater Group, OPD, WDGS.

s/J. A. Seitz
t/J. A. SEITZ
Lt. Colonel, G.S.C.
Executive, Pacific Section,
Theater Group, OPD, WDGS

A TRUE COPY:
s/ Charles D. Buss
CHARLES D. BUSS
1st Lt., SnC

PREVENTIVE MEDICINE SERVICE

3 November 1944

Memorandum for the Chief, Operations Service, SGO.
(Attn: Lt. Col. L. C. Bevil, Room 1020C)

Subject: Medical Officers for Assignment to POA.

1. Reference is made to attached copy of: (1) Memorandum for Colonel Johnson, Chief, Pacific Theater Section, OPD, subject as above, dated 1 November 1944, and signed by John Keliher, Colonel, GSC, AC of S, G-5, POA, and (2) Memorandum for Lt. Col. L. C. Bevil, subject as above, dated 2 November 1944, and signed by H. C. Johnson, Colonel, GSC, Chief, Pacific Section, Theater Group, OPD, WDGS.

2. In compliance with Col. Bevil's verbal request for the names of: (1) An officer qualified to be Chief of the Preventive Medicine Section on the staff of the Surgeon, POA, and (2) An officer qualified as matriologist for the staff of the Surgeon, POA, the following officers are recommended for assignment to these positions:

a. For Chief of Preventive Medicine Section on the staff of the Surgeon, POA: Lt. Colonel Thomas G. Ward, M.C., O-327263, at present assigned as Director, Epidemiology Division, Preventive Medicine Service, SGO.

b. For Matriologist for the staff of the Surgeon, POA: Lt. Col. Paul F. Harper, M.C., O-436882, at present assigned as matriologist, APO 709, c/o Postmaster, San Francisco, California.

3. The reassignment of Lt. Colonel Ward has been discussed with Brig. General James S. Simmons, USA, Chief, Preventive Medicine Service, SGO, and has his concurrence. It is anticipated that a numerical replacement for Colonel Ward will be requested at a later date.

4. The reassignment of Lt. Colonel Harper has also been discussed with General Simmons and Brig. General King, Theater Surgeon, POA, and is concurred in by both. It is recommended that in requesting the reassignment of Colonel Harper, The Surgeon, South Pacific Theater, be requested to inform this office through proper channels if a replacement will be required for Colonel Harper, and if so, when this replacement must be made available.

A TRUE COPY:

s/ Charles D. Buss
CHARLES D. BUSS
1st Lt., SnC

s/S. Bayne-Jones
t/S. BAYNE-JONES
Brig. General, U. S. A.
Acting Chief
Preventive Medicine Service

MEMORANDUM

24 November 1944.

SUBJECT: Preventive Medicine Program for the Pacific Ocean Area.

TO : The Surgeon, Headquarters, USAFPOA, APO 958.

1. The program of preventive medicine for the Pacific Ocean Area submitted in the paragraphs below is largely an outline of functions. It is recognized that this program will need revision from time to time as the undersigned becomes more cognizant of the particular problems in this area and as the military situation changes.

2. This program is based on AR 40-200, dated 3 November 1944, AR 40-210, dated 15 September 1942, AR 40-225, undated (to be published shortly), AR 40-27, dated 15 Nov 1932, and Section VIII, AR 40-1080, dated 10 December 1943. Other War Department publications concerning the prevention of disease have been adhered to and reference has been made in the pertinent paragraphs below.

3. Introduction. The preventive medicine program encompasses all medical matters which have to do with the preservation of health and the prevention of disease. The program is not concerned with the treatment of the sick and wounded or with the operational phases of military medicine except wherein advice regarding the prevention of disease is desired. The Chief, Preventive Medicine Section advises the Surgeon on matters within the scope of the section functions unless otherwise directed, in which case directive and supervisory functions will be assumed. Policies of the Surgeon regarding preventive medicine will be executed.

4. Communicable Disease Control.

a. Tropical disease, particularly malaria. The section will report to, advise and assist the Surgeon on matters concerned with the control of tropical diseases. In this connection liaison will be maintained with the Quartermaster regarding the supply of various insecticides, such as DDT, SKAT and Pyrethrum. Analysis of reports on tropical diseases and investigation of special tropical disease situations will be carried out. The Surgeon will be advised regarding the effective use of malariologists, malaria control and malaria survey units. All units and personnel concerned with malaria control should be under the direct control of the Surgeon, POA and should be attached, not assigned, to lower echelons. This will allow quick transfer of needed personnel and equipment to meet a threatening situation.

b. Venereal Disease. The section will advise the Surgeon on matters concerned with the prevention of the venereal diseases. The section, with the approval of the Surgeon, POA, will establish and supervise a venereal disease educational program for all U. S. Army

Forces operating in this area. Advice and recommendation will be made to the Medical Supply Officer regarding the procurement of prophylactic material, since the supply of such materials has recently become a function of the Medical Department. (A recent WD Circular - not yet in POA).

c. Other Communicable Diseases. Advice and recommendation will be rendered to the Surgeon, POA on preventive measures for other communicable diseases such as bacillary dysentery and the respiratory diseases. Reports will be analyzed and investigations of special situations will be carried out.

d. Statistics.

- (1) Epidemiological statistics with charts and graphs will be maintained in the section in accordance with Section VIII, AR 40-1080 and as provided in paragraph 2c, AR 40-200.
- (2) Charts and graphs showing mean strength, the annual mean non-effective rate, and rates for All Causes, Disease Only, Diarrhea and Dysentery, Respiratory Disease, Venereal Disease, Typhus Fever, Malaria, and such other diseases as the Surgeon may direct will be kept. Such graphs will show base command, air force, ground force and other special breakdowns.
- (3) A set of master cards showing a percentage distribution by cause of admission to hospital and/or quarters by months for each major component command will be maintained. A similar set for cause of death will also be kept current.
- (4) A set of master cards showing the non-effective days per diagnosis will be maintained.
- (5) A set of master cards showing the percentage distribution by medical cause for return of personnel to the United States will be maintained.

e. Immunization. The section will advise the Surgeon, POA, regarding the immunization policy to be followed in this theater. On the basis of such policy the appropriate directives will be prepared. Liaison will be maintained and assistance rendered the Medical Supply Officer regarding the procurement, storage and distribution of vaccines and other immunizing agents in accordance with policy established by the Surgeon, POA.

f. Laboratory. Liaison will be maintained with the Laboratory Consultant regarding the evaluation of laboratory reports of communicable disease and with regard to epidemiological problems encountered or anticipated and assistance will be requested in accordance with the Surgeon's policy.

5. Sanitation.

a. Under this heading the Preventive Medicine Section will advise the Surgeon regarding sanitary policies on housing, food handling, and environmental factors affecting health. The monthly sanitary reports will be reviewed, pertinent information abstracted, coordinated with interested section and indorsed in accordance with policy of the Surgeon, POA. A training program for the indoctrination of forces on basic sanitation and hygiene will be established and supervised.

b. A sanitary directive for POA will be prepared and will be revised as needed. Circulars and directives covering the use of new sanitary methods or applicances when adopted will be prepared.

6. Nutrition. The section will advise the Surgeon, POA, regarding food and feeding as it affects the health of the forces. The dietaries will be analyzed and changes recommended. In this connection close liaison and coordination will be established with the Quartermaster and the Food Service Program so that medical advice may be rendered in accordance with policies as established by the Surgeon, POA.

7. Sanitary Engineering. The preventive medicine section will advise the Surgeon, POA, regarding the matters concerned with sanitary engineering, such as the water supply and sewage disposal systems used by troops. In this connection garbage disposal, rodent control, the sanitary engineering aspects of swimming pools, and the checking of ships will be done in accordance with established policy.

8. Medical Intelligence. The Preventive Medicine Section will advise the Surgeon on the diseases to be encountered at target areas. The collection, analysis, and dissemination of data on captured enemy equipment, supplies and medical documents will be done. Liaison on intelligence matters will be established with the appropriate section, G-2, HPOA, and the U. S. Navy intelligence group. The section will also brief medical corps personnel on the diseases to be or likely to be encountered in enemy territory. Forward echelon medical department personnel will be instructed in the type of material and the documents desired by medical intelligence.

9. Quarantine. In the development of this program emphasis will be laid on the prevention of the dissemination of disease and pests in international traffic. Coordination and liaison will be maintained

with the civil authorities and the United States Public Health Service and action will be taken in accordance with established policy.

10. Industrial Hygiene. The section will advise, report to and assist the Surgeon in the supervision of environmental hygiene in Army-owned and Army-operated arsenals, depots or other industrial plants. Reports concerning industrial hazards found at time of investigation will be rendered and appropriate recommendations made concerning the correction of noted defects. The toxicologic effect of impregnated clothing and/or other materials coming in contact with the skin will be determined in conjunction with the appropriate laboratory or Chemical Warfare Service as indicated.

11. Anti-Biological Warfare. The Preventive Medicine Section will advise the Surgeon concerning appropriate measures for defense against biological warfare. Liaison and coordination of activities will be established with the Chemical Warfare Service. In this connection reference is made to letter AG 381 (9 February 1944) OB-S-B-M, subject: "Biological Warfare"; letter AG 381 (24 February 1944) OB-S-E-M, 28 March 1944, subject: "Defense Against Sabotage Methods of Biological Warfare in a Theater of Operations" and TB Med 45, dated 20 May 1944.

12. Miscellaneous.

a. The Chief, Preventive Medicine Section, will serve as technical consultant on matters of preventive medicine.

b. The section will supervise field investigations on new materials and devices for the prevention of disease in accordance with policy of the Surgeon, POA.

c. Preparation of the preventive medicine plan for tactical operations will be done.

d. Advice and recommendations will be rendered concerning the assignment of specialist preventive medicine personnel in POA.

13. Coordination of Activities. The Preventive Medicine Section will establish and maintain the necessary liaison with appropriate Army, Navy and Civil agencies in accordance with policies of the Surgeon, POA.

14. Reports. The section will handle sanitary reports from lower echelons, review the Essential Technical Medical Data reports from lower echelons and prepare the preventive medicine section of the ETMD for HPOA, and will prepare and render such reports as are necessary or as are directed in order to keep the Surgeon, POA fully informed regarding the state of health of the command and the status of the preventive medicine program.

15. The Chief, Preventive Medicine Section, and the personnel of the section will carry out such additional duties as the Surgeon, POA may direct.

16. Organization.

a. While it is recognized that the present allotment of officers and enlisted personnel to the Surgeon's Office, POA, has not been firmly established the table below is presented as the minimal needs to effectively establish and carry out the preventive medicine program outlined, and further, is presented in order that it may be used as future reference and in future planning.

OFFICERS

<u>BRANCH</u>	<u>TITLE</u>
MC	Chief, Preventive Medicine Section
MC	Epidemiologist
MC	Malariaiologist
SnC	Sanitary Engineer
MC	Venereal Disease Control Officer
MC	Medical Intelligence Officer
MC	Industrial Hygiene Officer
SnC	Nutrition Officer
SnC or MAC	Statistics and Security Officer

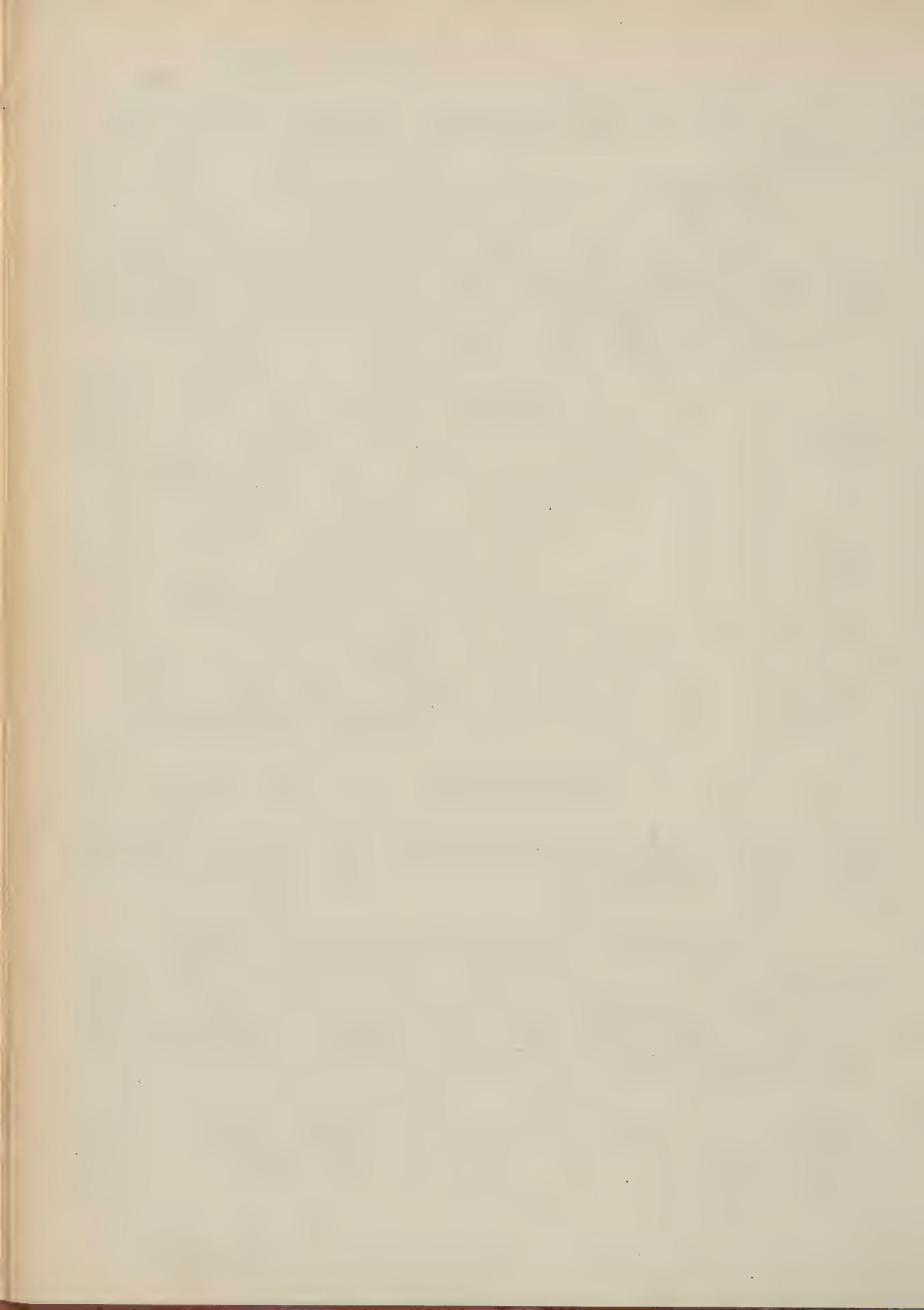
ENLISTED PERSONNEL

Fifteen (15) enlisted personnel will be required. Ten(10) of which will be used as statistical clerks and five (5) as clerk-typists. Ranks, grades and medical specialty numbers will be presented on the above personnel at a later date.

b. The Preventive Medicine Section should be supplied two (2) additional officers (Malariaiologist, MC and Sanitary Engineer, SnC) in addition to the undersigned at the earliest possible date. Also, two enlisted personnel (clerk-typists) should be assigned shortly. The organization presented in paragraph 15a above will be needed at later dates to accomplish the mission of a sound preventive medicine program for this theater.

A TRUE COPY:
s/Charles D. Buss
CHARLES D. BUSS
Lst Lt., SnC

THOMAS G. WARD
Lt Col, MC.



HEADQUARTERS UNITED STATES ARMY FORCES, PACIFIC OCEAN AREAS

MEMORANDUM TO ADJUTANT GENERAL:

Transmission of the following official radiogram, prepared in accordance with the provisions of AR 380-5, is requested in the classification and priority indicated.

In connection with radio No.

(From) (To)

RESTRICTED — **CONFIDENTIAL** — **SECRET** —

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Office of Origin: For the Surgeon:	Copies to:	Approved for Transmission:		
SURG (Section) KERMIT H. GATES, Colonel, M.C. (Signature and Title) Deputy Surgeon	G-4		
Sent as Radiogram No. R 41771	Time Filed 030630 Z	Check	Code Clerk	Copy No. 5388-29

DATE..... 28 NOVEMBER 1944

E X T R A C T

COMGENSOPACBACOM

FOLLOWING OFFICERS CAN BE SPARED WITHOUT REPLACEMENTS FROM YOUR AREA

IT IS UNDERSTOOD pd YOUR CONCURRENCE REQUESTED FOR REASSIGNMENT OF

* * * * *

LIEUTENANT COLONEL PAUL ABLE HARPER cma ZERO dash FOUR THREE SIX EIGHT
EIGHT TWO cma MIKE CHARLIE

0-436882

A TRUE EXTRACT PARAPHRASED COPY.

Charles D. Buss
CHARLES D. BUSS
1st Lt, SNC

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The making of an exact copy of this message is forbidden. Only such extracts as are absolutely necessary will be made and marked SECRET—CONFIDENTIAL—RESTRICTED. This copy will be safeguarded with the greatest care and will be returned to the originator without delay.

CWS 730

3 January 1945

SUBJECT: Bacteriological Warfare Report of APO 502, 708, 709, 244, 246, 247.

TO: Commanding General, USAFPOA, APO 958.

1. Pursuant to letter orders, file AG 210.453, Hq. USAFPOA, dated 2 December 1944, the undersigned officers proceeded to APO 958 to await air transportation on 4 December 1944 to subject APOs, returning to APO 958 on 31 December 1944. In the discharge of the temporary duty involved, the procedure outlined in Staff Memorandum No. 11, Hdqrs. USAFPOA, dated 25 September 1944, was followed. APO 708 was not included in the original letter orders but was so amended by the CG, SPBC, whose special staff wished the undersigned officers to hold a conference there for the benefit of certain officers of the 27th Infantry Division.

2. At each subject APO, a conference on Bacteriological Warfare was held attended by key chemical and medical officers of the jurisdiction. In the course of the conference, the potentialities of Bacteriological Warfare was discussed, followed by an open forum. The following points were included in the discussion.

a. Possible use of biological agents by the enemy in munitions against strategical areas, in a military sense.

b. Present known methods of individual protection, detection, and decontamination in the event such munitions are used.

c. Possible use of biological agents in sabotage of food and water supplies.

d. Procedures that can be used to control such possible sabotage.

3. After the conferences, paragraph 2 above, a brief inspection of control measures in effect for the protection of food and water supplies was made.

4. Conclusions. Evaluation of conditions observed relative to paragraph 3 above is as follows:

a. APO 502. This is the only area visited in which a considerable body of troops used water from a civilian water distribution system. However, even here the distribution and chlorination was found to be under the control of the Navy who was responsible for all

chlorination. The Surgeon, APO 502, inspects all water used from this system by the Army for a residual of 0.2 parts per million at stated intervals and more chlorine is added at the proper points if necessary. All other troops used lister bags for water supply. In view of the fact that the civil population involved is not of enemy alien extraction, and in addition no opportunity for large scale production of contaminant materials exists, nor access thereto, no other measures are recommended at the present time.

b. APO 708, 709, 244, 246, 247. None of these areas have a pre-existing civilian water system. The armed forces provide their own water, which is collected in tanks which serve as distribution points. The water is sometimes chlorinated at the source and sometimes chlorinated in the distribution tanks. In either case, chlorine residuals at the distribution points are checked and this seems to be adequate. It is a general practice that guards are not maintained at water points or distribution points. In view of the fact that all civilian enemy aliens are confined to camps administered by the military government authorities, the opportunity does not seem to exist for any large scale sabotage of water supplies. It is observed, however, that numbers of enemy military personnel are still uncaptured at APO 244, 246, and 247. To date, no food or water supply sabotage has been attempted. Constant checks on water at these points for heavy metal poisons is made. It would seem that the means for biological sabotage of water by the uncaptured enemy military personnel does not offer a serious threat at the present.

The system of sabotage control now in operation in the Hawaiian Islands was explained and the suggestion was made that such a system be considered when military personnel were in areas where a large enemy alien population existed, which was not restricted physically.

5. Recommendations. It is recommended that in the future officers of this Headquarters when traveling on similar missions be granted an air priority of at least 2 in order to avoid transportation delays at points where backlogs exist.

THOMAS G. WARD
Lt. Colonel, M.C.

R. BEVERLY CALDWELL
Major, C. W. S.

A TRUE COPY:
s/Charles D. Buss
CHARLES D. BUSS
1st Lt., SnC

SECTION 2

ANTI-BACTERIOLOGICAL WARFARE

7 December 1941 - 2 September 1945

ANTI-BACTERIOLOGICAL WARFARE

7 December 1941 - 2 September 1945

At the outbreak of the war, the Surgeon, Hawaiian Department, was made responsible for all activities in defense against sabotage of food and water supplies through the use of poisons or biological agents. The Department Surgeon was the Anti-Bacteriological Warfare (ABW) officer, assisted by a lieutenant colonel, SnC, major and captain, MC.

The Department Commander directed the Department Chemical Officer to make an inspection of all water facilities on the island of Oahu and to see that all necessary measures were taken to guard all sources of water supply.

The Department Chemical Officer promptly called upon the Department Engineer, the Department Surgeon, and the Manager and Chief Engineer of the Board of Water Supply, City and County of Honolulu. All parties concerned cooperated to the fullest extent, not only in the matter of water protection, but in gas protection as well. Arrangements were promptly made to safeguard all installations and army guards were provided.

The Surgeon instituted a comprehensive system of controls which checked all possible routes of mass infection or mass poisoning of military and civilian personnel in the Territory of Hawaii. In brief outline the controls set up were as follows:

A. Water Supplies

1. Chlorination of all water used by military personnel was made mandatory and apparatus for continuous chlorination of water supplies was obtained and installed as soon as possible.

2. An apparatus was devised for the continuous check of residual chlorine and installed in the Department Medical Laboratory at the 147th General Hospital.

3. Samples were taken every two hours from key spots in the water supply system throughout the territory and checked for residual chlorine.

4. Aquaria containing small fish which are susceptible to small amounts of poison, were placed in key spots throughout the territory. If the fish died suddenly it would have

been an indication of a poison in the water supply and steps could be taken to shut off the supply immediately. Most of these aquaria were in hospital laboratories or dispensaries.

5. Samples were taken daily from all principal water supply systems and check for chlorine demand and poisons by the Department Medical Laboratory. The tests were made using a set of simple, rapid analyses for all possible chemical contaminants.

6. Permanent guards were furnished and other security measures taken at all important points in the water system.

B. Food Supplies.

1. The use of fresh milk by military personnel was prohibited.

2. Civilians working in food plants were investigated for their loyalty to the United States.

3. Regular inspections were made of all food plants.

4. Military personnel were placed in ice cream and soft drink plants where they handled the mixing of ingredients and instituted security measures to prevent access of unauthorized persons to the ingredients.

5. Ice for use of military personnel was purchased only from plants owned by non-Japanese and later came almost exclusively from Army ice plants.

C. Measures for Specific Diseases.

1. All military personnel received yellow fever vaccination. Although there has been no yellow fever in the Territory of Hawaii for many years, the presence of the Aedes mosquito made this measure necessary as a protection against the possible introduction of yellow fever by the enemy.

2. Personnel and equipment were in readiness for extensive rodent control in case of outbreak of plague.

3. All planes entering the island were sprayed and examined for disease carrying insects which might have come in from other regions.

D. Miscellaneous Controls.

1. General Order No. 45, 27 December 1941, prohibited the sale of poisons of any nature except by drug stores or by wholesale selling to retail drug stores.

2. All chemical and biological laboratories were registered and employees of all such institutions were investigated for their loyalty to the United States.

E. Anti-Bacteriological Warfare Officers of Subordinate Commands.

An Army medical officer was designated Anti-bacteriological Warfare Officer for each task force, Army Garrison Force, including the Gilbert and Marshalls areas, to insure the application of proper precautionary measures. Reports of activities were submitted monthly, with special reports at any time such were indicated. A special kit for water and food control testing was developed by the Department Medical Laboratory and made available to each Anti-bacteriological Warfare officer.

On 15 August 1944 Colonel George F. Unmacht, CWS, Chemical Officer, USAFPOA was designated Bacteriological Warfare Officer of POA in addition to his other duties. The over-all responsibility thus passed from the Surgeon to the Chemical Officer. This was in agreement with the War Department policy as outlined in W.D. classified radio, WX-69725, 23 July 1944 which charged the Chemical Warfare Service with execution of all aspects of Bacteriological Warfare including intelligence, collaborating with the Medical Department on defensive aspects of the problem.

On 27 August 1944, Major R. Beverly Caldwell, CWS, pursuant to POA ltr orders, AGO, AGPO-A201-Caldwell, R. Beverly, dtd 12 August 1944, reported to the chemical officer, HUSAFOA for a period of temporary duty in connection with Bacteriological Warfare problems.

A series of conferences were held with the Surgeon, POA and the Surgeon Central Pacific Base Command. As an outcome of the conferences it was decided that the Surgeon would continue the excellent ABW measures outlined in Section I of this report, which had been in effect since the start of the war. In general, the distribution of responsibility was as follows:

Chemical Officer -- Pacific Ocean Area

- (1) Over-all responsibility for bacteriological warfare
- (2) Intelligence
- (3) Physical protection of troops, when indicated
- (4) Training of troops, when indicated
- (5) Strategic and tactical matters

Surgeon -- Pacific Ocean Area

- (1) Sabotage (control of food and water)
- (2) Biological protection of troops when indicated
- (3) Epidemiological control
- (4) Care and treatment of casualties

In view of the close relationship between the responsibilities of the Chemical Offices and the Surgeon on bacteriologic warfare matters, liaison was established and maintained between the two sections and each kept the other well-informed on all new information bearing on the bacteriologic warfare problem.

In October 1944, the Central Pacific Base Command Chemical Office set up a Bacteriological Warfare Section and assumed responsibility for inspections and controls within its command.

Realizing the possibility of a bacteriological warfare attack by the enemy, E-4 outlet valve filters were ordered. This is a special device which adds to the protection against bacteria afforded by the standard gas mask. Four hundred and twenty-five thousand of them were stored in security on Saipan.

Just prior to the cessation of hostilities, a comprehensive plan was drawn up and submitted to Commander in Chief, Armed Forces, Pacific, (CinCAFPAC), for approval for the use of VKL on the vegetable gardens of by-passed islands in this theater. VKL is a chemical compound which inhibits the growth of plants. It can be sprayed from aircraft using M10 or E2 spray tanks. The plan considered the use of VKL on the main by-passed islands and included information on military

and civil population, acreage under cultivation as determined from aerial photographs, and the logistical requirements of such an operation. The G-2 Section of this headquarters assisted in the preparation of the plan by furnishing data on population and acreage under cultivation.



SECTION 3

THE TREATMENT OF SYPHILIS AND GONORRHEA

NORTH SECTOR GENERAL HOSPITAL

7 December 1941 to 15 September 1945

The Treatment of Syphilis and Gonorrhea
at

The North Sector General Hospital, APO 957
7 December 1941 to 15 September 1945

On 7 December 1941, the management of venereal diseases at this hospital was the responsibility of the Genito-Urinary Section of the Surgical Service, this was the arrangement usual in all hospitals at that time. This plan was continued until clinical research and compiled reports proved that the management of venereal diseases was chiefly a problem of chemotherapy, and, as such, should be treated by the Medical Service. In response to the direction of a War Department Letter in December 1942, a Section for Dermatology and Syphilology was established at this hospital in April 1943. Later, the management of gonorrhea and other venereal diseases were likewise transferred to the Medical Service; in February 1944 a Section of Dermatology and Venereal Diseases was formed. This plan exists to date.

There has been a decided tendency to lowered venereal rates in this department from the time of Pearl Harbor to 15 September 1945. Many factors are responsible for this finding. Houses of prostitution operated freely under the inspection of civilian and military authorities. With in influx of troops following Pearl Harbor, many easily accessible prophylactic stations were installed. At the peak of their operation, as many as 80,000 or more chemical prophylactics were given monthly. In September 1944, all houses of prostitution were closed by police order; there followed an immediate decrease in venereal rates. Temporary rises in venereal rates since then are directly attributable to "off-shipping" contacts.

At the time of the attack on Pearl Harbor, the standard treatment for early and latent syphilis was the time-honored weekly injection of an arsenical, usually neoarsphenamine, or bismuth, in alternating courses of eight to ten injections per course. The minimum required total treatment in the Army was 30 injections of an arsenical and 30 injections of bismuth. This form of treatment was lengthy, requiring over a year for completion. Such treatment plan was not well suited to the optimum management of large groups of men undergoing training or engaged in other wartime practices. At this time the intensive, rapid arsenical treatment of syphilis had received

thorough trial and investigation. WD Circular Letter No. 74, dated 25 July 1942 authorized a dramatic change in the treatment of early and latent syphilis. The prescribed course provided a total of 40 injections of mapharsen and 16 injections of bismuth to be given in a 26 week, uninterrupted period; mapharsen was to be given in dose of 0.06 gm twice weekly in two ten week periods with bismuth 0.2 gm given concomitantly the first and last five weeks; bismuth alone was given in the central six week period. This plan of treatment was found superior almost immediately. The total period of time required for treatment was now less than half that required formerly. In addition, the use of the much less toxic mapharsen resulted in a noticeable decrease in untoward reactions to arsenicals. The shorter period for active treatment and the more readily tolerated arsenical induced more regular treatment. Technical difficulties incident to the preparation of arsphenamine and neoarsphenamine were eliminated; preparation of mapharsen could now be intrusted to less highly trained technicians. Reactions to the intensive method were encountered, however, they were usually mild. Except for the rare occurrence of exfoliative dermatitis, reactions did not as a rule necessitate interruption of treatment. Most commonly incurred reactions were gastrointestinal, including diarrhea, nausea, or emesis. The symptoms were controlled readily by eliminating ingestion of food immediately prior to or following injections of mapharsen, the use of mild cathartics the night preceding injections of mapharsen, and the generous administration of thiamin hydrochloride and cevitamic acid orally.

This plan of treatment for early and latent syphilis was continued until July 1944 when the Office of the Surgeon, Headquarters, United States Armed Forces Central Pacific Area authorized the use of penicillin in untreated primary and secondary syphilis. The schedule recommended 60 consecutive intramuscular injections of 50,000 units every three hours, totaling 2,400,000 units. TB MED 106, dated 11 October 1944 authorized the use of penicillin in untreated latent syphilis, in treated early and latent syphilis that had not responded to mapharsen-bismuth therapy, and in treated early and latent syphilis that had reacted unfavorably to mapharsen-bismuth therapy. Pencillin therapy necessitated hospitalization in all cases for a minimum of 8 to 10 days. This loss of effective time was decidedly less than with previous treatment schemes. To date 81 cases have received the penicillin treatment for syphilis in this hospital. In no case was it necessary to discontinue therapy due to reaction. A small per-

centage of cases reacted with mild, transient urticaria or with Herxheimer effects of fever and exacerbation of primary and secondary lesions. In over 80 percent of cases there was a rise in Kahn titre during the period of active treatment. In all cases the Kahn titre exhibited an early trend to reversal. No instances of relapse have been noted to date.

There has been little change in the treatment of visceral or central nervous system syphilis since the advent of Pearl Harbor. Currently there is a tendency to earlier use of hyperpyrexia in neurosyphilis. The present methods and criteria for treatment for neurosyphilis are outlined in TB Med 48, dated 31 May 1944. Asymptomatic neurosyphilis with types I and II spinal fluid changes receive a six month trial of mapharsenbismuth chemotherapy. If there are little or no changes in the spinal fluid after this treatment, hyperpyrexia is indicated. Type III spinal fluid changes in asymptomatic neurosyphilis and all varieties of symptomatic neurosyphilis except acute syphilitic meningitis, will receive fever therapy as soon as the diagnosis is established. Mapharsen-bismuth chemotherapy is combined with hyperpyrexia and is continued for a minimum of six to twelve months after completion of fever. There is a current tendency to the use of shorter periods of elevated temperature given at more frequent intervals in preference to the older practice of maintaining fever for several hours. The prescribed course recommended is a total of 40 to 45 hours of fever of 105° F., or higher, given in divided treatments of three to four hours twice weekly. Penicillin has been used with moderate to marked success in many forms of neurosyphilis, however, this has not been authorized for this purpose in this department.

In the latter part of 1941, treatment for gonorrhea was in large part surgical, with utilization of irrigations, instillations, diathermy, and prostatic massage, combined with the use of sulfonamides. WD Circular Letter No. 74, dated 25 July 1942 recommended the use of sulfadiazine or sulfathiazole, grams one four times daily for five days in uncomplicated cases. Sulfonamide-resistant cases warranted the use of gentle massage of the prostate and instillation of mild silver protein. Sulfonamide treatment of gonorrhea was expected to result in cure in 75 percent of uncomplicated cases. At this hospital a cure rate of 60 percent was attained. WD Circular Letter No. 97, dated 12 May 1943 authorized the use of combined fever and chemotherapy in sulfonamide-resistant cases. Sulfathiazole or sulfadiazine, total of nine grams, was to be given in divided doses in an 18 hour period prior to fever. Hyperpyrexia was to be continued for approximately eight hours, with an elevation of 105.8 to

106.2° F. Such cases as did not respond to one treatment would receive a second treatment after a lapse of not less than one week. Cure was obtained in approximately 76 percent of cases of sulfonamide-resistant gonorrhea. TB Med 96, dated 21 September 1944 designated penicillin as the treatment of choice in gonorrhea. The prescribed treatment schedule recommended 20,000 units of penicillin intramuscularly every three hours for five injections or 100,000 units; if a favorable response was not apparent in three days, a second course of 100,000 was to be given. Those not responding to two such courses were to receive a third course of penicillin totalling not less than 300,000 units. If a favorable response had not resulted from the above therapy, a routine course of sulfadiazine or sulfathiazole was to be given. Outpatient treatment of uncomplicated gonorrhea was authorized in this letter, however, conditions peculiar to this department demanded that all cases of gonorrhea be hospitalized for treatment. Cure is determined by negative clinical and laboratory examinations after an observation period of three weeks, even though a mild to moderate mucoid or clear discharge persisted. Initial reports with this new treatment predicted cure in 95 to 99 percent. Results with this treatment method fell far below this level; were not appreciably superior to those obtained with sulfonamides alone, cure in approximately 75 percent. No reason for this low rate of cure is offered other than the fact that many of the cases treated were recurrent, chronic, gonorrhea. Seeking a more satisfactory treatment method, sulfonamides and penicillin were given concomitantly from the onset with the surprising result of cure in 95 percent in a small series.

Verbal orders authorizing the treatment of gonorrhea on an outpatient basis were issued by the Commanding Officer of this hospital in July 1945. The recommended treatment was four injections of penicillin, 50,000 units each at intervals of two hours. To date 17 cases have received this treatment, with cure in 16.

In conclusion, the treatment of syphilis and gonorrhea has changed dramatically through the introduction of penicillin. Current results from this treatment are superior to any single or combination treatment methods in the past.

SECTION 4
SANITARY CONSULTANT
OFFICE OF THE SURGEON, UNITED STATES
ARMED FORCES, MIDDLE PACIFIC

SANITARY CONSULTANT
OFFICE OF THE SURGEON
UNITED STATES ARMED FORCES, MIDDLE PACIFIC

The Sanitary Consultant is a member of the Preventive Medicine Section of the Surgeon's Office, Middle Pacific. As this chapter deals solely with the activities coming under this position, it is written as a single unit within the Preventive Medicine History without further breakdown.

A study was made in March 1945 of all Sanitary Corps personnel in the theater to determine proper assignment of individuals. It was found that a number were improperly assigned.^{5 6 7} The largest discrepancies occurred in the group of sanitary engineers. Several of them were found to be in hospitals, filling sections of the T/O's meant for laboratory officers, and several were found to be attached to Army Ground Forces Headquarters which had no T/O allotment for them. The problem in this case was one of transferring these men from the hospitals and increasing Army Ground Forces Headquarters allotments to include them. The former was accomplished in part by transferring the sanitary engineers from the hospitals to proper assignments as these assignments became available. The latter could not be accomplished as the T/O's in question were never adjusted to include sanitary engineers.^{7 8 9} An attempt was made to improve the situation by the proper assignment of new personnel as they reached the theater. However, it was learned from the Personnel Section, Surgeon's Office, Pacific Ocean Area, that all such assignments were controlled by the Replacement Training Command, Pacific Ocean Area. Through cooperation with this command some improvement was made.⁷ On 15 June 1945, a resurvey was made of Sanitary Corps personnel in this theater.^{7 10}

As operations moved west of the 140th East Meridian, it became necessary to consider the possibilities of schistosomiasis infection. A circular¹¹ was published in March 1945 to cover treatment of water in areas where this disease was prevalent.

While the matter does not lend itself readily to documentation, close cooperation has been maintained between this office and the Engineer's Office, Pacific Ocean Area, in construction and maintenance problems involving sanitation. Primarily these problems have dealt with water supply and treatment, and the supply of equip-

ment and materials necessary for this function. Other problems were centralized disposal of wastes and the construction of hospitals.

The Tenth Army planned the invasion of Okinawa from its Oahu headquarters. Special water purification procedures¹² were worked out in conjunction with the 18th Medical General Laboratory with emphasis on the treatment of water containing amebic cysts and cercariae of schistosomiasis. These procedures were followed throughout the campaign with good results. All planning on water treatment was based on the utilization of the standard sand filter units of the Engineer Corps.

The Tenth Army was the only outfit which had an operation scheduled and between the Pacific Ocean Area Engineer, the Tenth Army Engineer and the Pacific Ocean Area Sanitary Consultant, requirements were revised to include diatomite filters.¹³ Approximately half of the required filters were to be diatomite and the other half sand, this holding true for both T/E equipment and base development equipment. Requisitions¹³ were changed accordingly but no diatomite filters were delivered, supply difficulties apparently having developed, and sand filters were utilized entirely.

A trip was made to the forward islands by the Sanitary Consultant¹⁴ from 23 June to 25 July 1945 for the purpose of investigating the water supplies and waste disposal systems. In general sanitary conditions were found to be quite satisfactory. The islands visited follow.

On Saipan⁸ there was a scarcity of water due to the lack of equipment. Wood stave and Japanese transite pipe were being used wherever possible, however, these constantly needed repairing and in several instances the wood stave pipe completely failed as a water carrying vehicle. Many pumps and allied equipment were constantly being over-worked to meet the demand with consequent wear and deterioration. Replacement parts and equipment were few. Maintenance of the system was difficult. Garbage was being satisfactorily disposed of by dumping into the sea.

The water supply on Tinian⁹ was satisfactory from the standpoint of quality and quantity. This supply was being increased as new installations were under construction. The new ground water development was well under way and the indications were that the supply thus obtained would be highly satisfactory. A new garbage chute was under construction for dumping into the sea as the currents at the old

location had changed due to the construction of a harbor break water. Large metal containers were disposed of by dumping them off a point where the tide kept them moving out into deep water.

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At the 373rd General Hospital on Guam, the effluent from the septic tank was distributed over a coral bed. The earth wall around this bed had broken through and the liquid coursed down the hillside, resulting in unsatisfactory purification and an odor nuisance. Water supplies were satisfactory but the systems were being improved on and expanded constantly. Garbage disposal was accomplished by dumping in the sea.

On the Island of Peleliu water for drinking was being satisfactorily supplied by wells and distillation units. Garbage was hauled to sea in barges.

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At this stage the water supply for Iwo Jima ¹⁷ was under development. It became more and more evident that the ground source was unsuitable for drinking due to the high chemical content. The plan was to develop this source for all purposes other than drinking and to distill water for drinking. Garbage was being disposed of by sanitary fill while the dumping point for disposal into the sea was being completed.

Okinawa had been secured for only a short period of time and due to the common use of night soil as fertilizer, special methods in water purification^{12 18} were necessary. The application of these methods, chlorination, coagulation, sedimentation and filtration, and the maintaining of 1 ppm residual chlorine in finished water, was giving good results. Garbage was being buried and a chute for dumping into the sea was under construction at Marpo Point.

Human wastes on all the islands visited were being disposed of by pit latrines and urinal soakage pits, with the exception of several hospitals which utilized septic tanks and purification fields.

A conference was held with the President of the Board of Health, Territory of Hawaii, 7 July 1945, to discuss the question of chlorination for the City of Honolulu water supply. It developed during this conference that all of the Honolulu water is not of artesian source, approximately 8 percent coming from mountain sources (tunnels and springs) which are subject to contamination. Other possibilities of contamination within the distribution system itself were brought out. The President of the Board agreed that chlorination of the Honolulu water supply should be continued. General Richardson

was advised of the results of the conference and a recommendation was made to him that the policy of chlorination of the Honolulu water supply should be continued.

During the rest of July discussions²⁰ were held with individuals of the Surgeon's Office, Central Pacific Base Command, and with personnel of the Territorial Board of Health. Everyone agreed that the Honolulu water should continue to be chlorinated with the exception of the Manager and Chief Engineer of the Honolulu Board of Water Supply.

During the latter part of July Mr. Frederick Ohrt wrote General R. C. Richardson a letter¹⁹ requesting that the chlorination of the city water supply be no longer required. General Richardson sent a routing slip²⁰ to the Surgeon, Middle Pacific, requesting the complete file on chlorination of the Honolulu water supply, stating that he understood that the Surgeon felt that chlorination was necessary. He further stated that he could not defend it under General Order No. 154,²¹ which was instituted for fear of bacteriological warfare, unless the Surgeon could show that the continuation of the chlorination of the water was necessary for the health of the command.

The Middle Pacific, Pacific Ocean Area, Central Pacific Area and Hawaiian Department files were explored to obtain all the background on the institution of the chlorination of the Honolulu water supply. The matter goes back to June of 1942 when Dr. D. B. Herter of Honolulu wrote a letter to the Commanding General, Hawaiian Department, describing the dangers of bacteriological warfare. Starting with this event chronological data were compiled of succeeding events bearing on the subject and submitted as an inclosure to the reply to General Richardson's routing slip.²⁰ This chronology takes us through the correspondence with the War Department which resulted in action being taken to guard against bacteriological warfare and the subsequent publication of General Order No. 154²¹ requiring chlorination of the Honolulu water supply. More correspondence follows regarding the development of the chlorination program and the chronology ends by bringing the matter up to date and the recommendation that chlorination of the Honolulu water supply be continued.

On 6 August 1945, General Richardson replied²² to Mr. Ohrt's letter of 27 July and enclosed a graph which showed bacteriological results of examinations of samples of water taken from established sampling points on the Honolulu distribution system. General Richardson stated that the graph showed that a certain percentage of

the water samples collected from the system in years prior to the beginning of chlorination were contaminated, and since chlorination was initiated no samples have shown contamination, also that as troops are moving to forward areas through the Island of Oahu the removal of the present chlorination practice would expose these forces to an unnecessary health hazard; further, that in view of the foregoing he felt that the provisions of General Order No. 1-54 regarding the chlorination of the water supply should remain in effect in order that the health of his command not be jeopardized.

A number of newspaper items began to appear in the local papers during the month of August criticizing the application of chlorine to the water supply. In view of this, a complete study was made by this office to determine the name, location and strength of military installations being furnished water from civilian sources. This study²³ was submitted to the Surgeon with the general recommendation that all drinking water furnished troop installations be chlorinated, maintaining a contact period of 30 minutes and a residual in the active parts of the system of 0.2 ppm. It was pointed out that if the City of Honolulu ceased to chlorinate its water supply, chlorination at Army installations would not be practical as such large numbers of troops frequent Honolulu.

On 27 September, the Board of Water Supply, Honolulu, decided to stop chlorination of the supply effective 30 September. The Surgeon's Office has followed these developments very closely. It is a matter for the local government to decide what it will do in regard to treatment of its water supply and, since it has seen fit to stop chlorination, the Surgeon has initiated a system of collecting daily water samples for bacteriological examination from representative points on the systems within military areas to determine any change in bacteriological quality. In conjunction with this the Engineer, Middle Pacific, is making a study of all available chlorination equipment with the view of utilizing it where needed should the necessity arise.²⁴

ROBERT H. GREGORY
Major, SnC
Sanitary Consultant

REFERENCES

[Portion of document referring to references one through four deleted from this reproduction.]

5. Inclosure No. 1 to this report.
6. Inclosure No. 2 to this report.
7. Personnel Records, Personnel Section, Surgeon's Office, POA.
8. Ltr to CG, USAFPOA, fr Sanitary Consultant POA, subj: "Investigation of water supply and waste disposal systems at AGF 244," 27 Jun 45. On file, Record Room AGO, MIDPAC, file 671.1/19.
9. Ltr to CG, USAFPOA, fr the Sanitary Consultant, POA, subj: "Investigation of Water Supply and Waste Disposal Systems at Tinian," 1 Jul 45. On file, Record Room AGO, MIDPAC, file 671.1/19.
10. Inclosure No. 3 to this report.
11. Circular No. 40, HUSAPOA, subj: "Special Water Purification Procedures in Areas where Schistosomiasis is Prevalent," 13 Mar 45. On file, Record Room AGO, MIDPAC, file 300.4.
12. Bulletin. "Special Water Treatment Procedures," Hq, Tenth Army, 13 Feb 45. On file, Record Room, POA Engr's Office.
13. Requisitions for water purification equipment, POA Engr. On file, Record Room, POA Engr's Office.
14. Ltr Order, POPER 201-Gregory, Robert H. Jr. (O), HUSAPOA, dtd 19 Jun 45, subj: "Travel Orders." On file, Record Room AGO, MIDPAC, file POPER 201-Gregory, Robert H. Jr. (O).

15. Ltr to CG, USAFPOA, fr the Sanitary Consultant, POA, subj: "Investigation of Water Supply and Waste Disposal Systems on Guam," 4 Jul 45. On file, Record Room, AGO, MIDPAC, file 671.1/10.
16. Ltr to CG, USAFPOA, fr the Sanitary Consultant, POA, subj: "Investigation of Water Supply and Waste Disposal Systems on Peleliu," 8 Jul 45. On file Record Room, AGO, MIDPAC, file 671.1/18.
17. Ltr to CG, USAFMIDPAC, fr Sanitary Consultant, MIDPAC, subj: "Investigation of Water Supply and Waste Disposal Systems on Iwo Island," 11 Jul 45. On file, Record Room, AGO, MIDPAC, file 671.1/18.
18. Ltr to CG, USAFMIDPAC, fr the Sanitary Consultant, MIDPAC, subj: "Investigation of Water Supply and Waste Disposal Systems on Okinawa," 21 Jul 45. On file, Record Room, AGO, MIDPAC, file 671.1/20.
19. Ltr to General Robert C. Richardson, Jr., fr Mr. Frederick Ohrt, Manager and Chief Engr, Board of Water Supply, Honolulu, T. H. 27 Jul 45. On file, Record Room, AGO, MIDPAC, file 671.1/11.
20. R/S to Surg MIDPAC fr CG, MIDPAC, subj: "Chlorination of Honolulu Water," 28 Jul 45, (with Inds.), on file, Record Room, AGO, MIDPAC, file 671.1/11.
21. Inclosure No. 6 to this report.
22. Ltr to Mr. Frederick Ohrt, Manager and Chief Engr, Board of Water Supply, Honolulu T. H. fr General R. C. Richardson, Jr., CG, MIDPAC, 6 Aug 45. On file, Record Room, AGO, MIDPAC, file 671.1/11.
23. Inclosure 5 to this report.
24. R/S to Surg, MIDPAC, fr CG, MIDPAC, subj: "Chlorination of Honolulu Water," 7 July 45, (w/Inds.). Inclosed in part in this report (Incl. No. 7.). Remainder of correspondence is in CG's Office, MIDPAC, awaiting action.

10 March 1945.

OVER AND SHORT LISTING OF SANITARY CORPS PERSONNEL IN POA

TENTH ARMY

156 Station Hospital - short one 3307
9 Station Hospital - short one 3307
719 San Co - all three officers are SnC; one 3315, one 7960, one?
7 Infantry Division - (No T.O.) - over one 7960
96 Infantry Division - (No T.O.) - over one 7960
14 Medical Laboratory - over one 3309
AGF 245 - (No T.O.) - over one 7960

CPBC

22 Station Hospital - short one 3307
147 General Hospital - short one 3307, over one 7960
717 San Co - one officer is 7960
218 General Hospital - over one 7960
18 General Laboratory - short two 3309, short one 3307

AGF 244

148 General Hospital - short one 3309, over one 7960
39 General Hospital - over one 3307
217 Mal Surv - over one 3310

AGF 246

204 General Hospital - short one 3309, short one 3311, over two
7960

AGF 247

374 Station Hospital - short one 3307, over one 7960
Surg. O. - (No. T.O.) over one 7960

SPBC

20 Station Hospital - short one 3307
109 Station Hospital - over one 7960
122 Station Hospital - short one 3307, over one 7960
137 Station Hospital - short one 3307
5 Conv Hospital - (No T.O.) over one 3307
8 General Hospital - over one 3309

ROBERT H. GREGORY
Major, Sanitary Corps
Sanitary Consultant

Incl. 1 /s/ Charles D. Buss
 CHARLES D. BUSS
 1st Lt, SnC

10 March 1945.

MEMORANDUM:

TO : Lieut Marsh.

Suggest the following be incorporated in reply to cited letter:

In reply to your inquiry in paragraph c, SGO letter, 27 January 1945, subject: "Acknowledgement of November ETMD Report," the following information is submitted regarding the Sanitary Engineering Organization and personnel available in this theater.

SANITARY ENGINEERING ORGANIZATION AND PERSONNEL
USAFFPOA

Commands	Rank	Sanitary Engineer	Parasitologist	Entomologist
HUSAFFPOA	Maj	1	0	0
CPBC	Maj	2	0	1
	Capt	5	2	1
	1st Lt	5	0	0
	2nd Lt	0	0	1
SPBC	Maj	0	0	0
	Capt	14	3	6
	1st Lt	4	5	3
	2nd Lt	0	1	0
AAFPOA	Maj	1	0	0
	Capt	1	0	0
Tenth Army	Lt Col	1	0	0
	Maj	0	0	0
	Capt	5	3	3
	1st Lt	4	1	3
	2nd Lt	0	2	1
AGF 86	Capt	1	0	0
AGF 244	Capt	2	0	1
	1st Lt	0	1	0
	2nd Lt	0	1	0

Incl 2

Memorandum to Lieut Marsh. (Contd)

Commands	Rank	Sanitary Engineer	Parasitologist	Entomologist
AGF 246	Capt	1	0	0
	2nd Lt	1	0	0
AGF 247	Capt	1	0	0
AGF 264	Capt	1	0	0
SUB-TOTAL (all Commands by grades) USAFPOA	Lt Col Maj Capt 1st Lt 2nd Lt	1 4 31 13 1	0 0 8 7 4	0 1 11 6 2
TOTAL (all commands) POA	All	50	19	20

R. H. GREGORY
Major, SnC
Sanitary Consultant.

A TRUE COPY:

/s/ Charles D. Buss
CHARLES D. BUSS
1st Lt, SnC

POA PERSONNEL

15 JUNE 1945.

UNIT	SANITARY CORPS OFFICERS		SANITARY ENGINEER (7960)	
	Autzd	Asgd	Autzd	Asgd
5th Conv Hosp	0	1	0	0
8th Gen Hosp	2	2	0	0
29th Gen Hosp	2	2	0	0
39th Gen Hosp	2	3	0	0
147th Gen Hosp	3	2	0	0
148th Gen Hosp	3	3	0	1
204th Gen Hosp	3	3	0	1
218th Gen Hosp	3	4	0	1
219th Gen Hosp	3	3	0	0
232d Gen Hosp	2	2	0	0
233d Gen Hosp	2	1	0	0
317th Gen Hosp	2	2	0	0
318th Gen Hosp	2	2	0	0
9th Sta Hosp	1	0	0	0
20th Sta Hosp	1	1	0	0
22d Sta Hosp	1	0	0	0
27th Sta Hosp	1	1	0	0
31st Sta Hosp	1	1	0	0
48th Sta Hosp	1	1	0	0
75th Sta Hosp	1	1	0	0
109th Sta Hosp	1	1	0	0
122d Sta Hosp	1	1	0	0
137th Sta Hosp	1	0	0	0
156th Sta Hosp	1	0	0	0
176th Sta Hosp	1	1	0	0
369th Sta Hosp	1	1	0	0
373d Sta Hosp	1	1	0	0
374th Sta Hosp	1	1	0	0
Hq, CPBC, Surg O	3	4	*	1
HPOA	3	2	*	1
HSPBC	3	2	*	2
Hq, 10th Army, Med Sec	2	2	0	0
XXIV Corps, Surg O	0	1	1	1
32d Med Hosp Ctr	2	1	1	1
AGF, APO 86	1	1	1	1
AGF, APO 245	1	1	0	1
AGF, APO 247	0	1	1	1
AGF, APO 457	1	1	1	1
AGF, APO 458	1	1	1	1
QM Sec, Isl Comd, APO 502	1	1	*	0

Incl 3

UNIT	SANITARY CORPS OFFICERS		SANITARY ENGINEER (7960)	
	Autzd	Asgd	Autzd	Asgd
Hq, Isl Comd, APO 708	3	2	*	1
Hq, Isl Comd, APO 709	2	2	*	1
Schofield Disp #2	1	1	1	1
24th Mal Contr Det	1	1	1	1
36th Mal Contr Det	1	1	1	1
39th Mal Contr Det	1	1	1	1
40th Mal Contr Det	1	1	1	1
41st Mal Contr Det	1	1	1	1
74th Mal Contr Det	1	1	1	1
75th Mal Contr Det	1	1	1	1
76th Mal Contr Det	1	1	1	1
78th Mal Contr Det	1	1	1	1
115th Mal Contr Det	1	1	1	1
122d Mal Contr Det	1	1	1	1
175th Mal Contr Det	1	1	1	1
176th Mal Contr Det	1	1	1	1
177th Mal Contr Det	1	1	1	1
201st Mal Surv Det	2	2	0	0
203d Mal Surv Det	2	2	0	0
214th Mal Surv Det	2	2	0	0
215th Mal Surv Det	2	2	0	0
216th Mal Surv Det	2	2	0	0
217th Mal Surv Det	2	2	0	0
219th Mal Surv Det	2	2	0	0
221st Mal Surv Det	2	2	0	0
222d Mal Surv Det	2	2	0	0
415th Mal Surv Det	2	2	0	0
420th Mal Surv Det	2	2	0	0
442d Mal Surv Det	2	2	0	0
443d Mal Surv Det	2	1	0	0
444th Mal Surv Det	2	2	0	0
445th Mal Surv Det	2	2	0	0
446th Mal Surv Det	2	2	0	0
527th Mal Contr Det	1	1	1	1
604th Mal Surv Det	2	2	0	0
605th Mal Surv Det	2	2	0	0
606th Mal Surv Det	2	2	0	0
607th Mal Surv Det	2	2	0	0
5th Med Det(Museum & Arts)	1	1	0	0
6th Med Lab	4	4	0	0
14th Med Lab	4	5	0	0
18th Med Gen Lab	14	12	2	2

Incl. 3

UNIT	SANITARY CORPS OFFICERS		SANITARY ENGINEER (7960)	
	Autzd	Asgd	Autzd	Asgd
68th Med Depot Co	3	3	0	0
81st Med Gp	0	1	0	1
7th Inf Div	0	1	0	1
96th Inf Div	0	1	0	0
Hq, 13th Repl Depot	1	1	1	1
Hq, 23d Repl Depot	1	1	1	1
Hq, 25th Repl Depot	1	1	1	1
719th Sanitary Co	3	3	0	1
821st Hosp Ctr	2	2	1	0
6261st School of Prev Med	7	0	1	0
Atchd Unasgd 13th Repl Depot	4	-	-	-
Atchd Unasgd Det of Patients	1	-	-	-
TOTAL	170	155	31**	42

*Overhead organizations whose Table of Allotment does not specify the classification of the Sanitary Corps officers authorized.

**Six (6) Sanitary Engineers (7960) are assigned to overhead organizations whose Table of Allotment does not specify the classification of the Sanitary Corps officers authorized.

SANITARY CORPS OFFICERS IN THE POA, CLASSIFIED
AS SANITARY ENGINEERS (7960)

<u>NAME</u>	<u>GRADE</u>	<u>ORGANIZATION</u>	<u>PRESENT DUTY</u>
Ahlgren, Clarence L	1st Lt	18th Med Gen Lab	Ch of Sn Chem Sec
Barrett, Max L	Capt	Hq 10th Army Surg O	San Engr (Asst)
Bartlett, Joseph K	1st Lt	527th Mal Control Det	CO San Engr
\$Bogren, George R	Capt	81st Med Grp	Asst Med Insp
Campbell, Elmer W	Capt	32d Med Hosp Ctr	San Engr
*Colvin, Dean E	Capt	Hq Isl Comd, APO 708	San Insp. Asst Med Insp
Cornell, Cecil H	Lt Col	18th Med Gen Lab	Ch of Chem Branch
Cranford, Charles A	Capt	25th Repl Depot	
#Croley, Donald R	1st Lt	719th San Co	Med Unit C.O.
Cronin, John J	Capt	74th Mal Contr Det	San Engr
Crowell, Henry B	Capt	24th Mal Contr Det	San Engr
#Fulmer, Frank E	Capt	204th Gen Hosp	Asst Med Insp
*Gahr, William N	Capt	QM Sec Isl Comd APO 502	San Officer
*Gregory, Robert H Hagberg, Ralph A	Major Capt	HPOA AGF, APO 86	San Engr San Engr
Harrison, Eugene O	Capt	40th Mal Contr Det	San Engr
Hilton, Roger R	Capt	76th Mal Contr Det	C.O. San Engr
\$Holtje, Ralph H	Capt	AGF APO 247	San Engr
Jannett, Anthony V III	1st Lt	177th Mal Contr Det	San Engr
\$Jones, Kermit E	Major	7th Inf Div	Med Insp

SANITARY CORPS OFFICERS IN THE POA, CLASSIFIED
AS SANITARY ENGINEERS (7960) (Cont'd)

<u>NAME</u>	<u>GRADE</u>	<u>ORGANIZATION</u>	<u>PRESENT DUTY</u>
Joseph, Edwin B	Capt	39th Mal Contr Det	C.O. San Engr
Kaufman, Arthur W	Capt	75th Mal Contr Det	Med Unit C.O. San Engr
Komline, Thomas R	1st Lt	Schofield Disp #2	Med Insp San
*Larson, Keith D	Capt	HSPBC APO 502	Asst San Off
*Matsinger, George H	Major	Hq CPBC, Surg O	San Engr
Meyer, Fred H	1st Lt	AGF APO 245	Sn O
Mitchell, Desso T	Capt	AGF APO 457	Sn Engr
Nally, Harvey D, Jr	1st Lt	AGF APO 458	
Pfeiffer, Frederick R	Capt	41st Mal Contr Det	San Engr
#Piner, Raymond E	Capt	122d Sta Hosp	Med Insp
Pollard, Robert T	1st Lt	175th Mal Contr Det	San Engr
Randow, Melvin H	1st Lt	122 Mal Contr Det	San Engr
Schaefer, Edward W	Capt	36th Mal Contr Det	San Engr
*Scott, Ralph H	Major	Hq Isl Comd APO 709	Office Exec (Asst Med Insp)
Spies, Wilbert E	Capt	Hq 23d Repl Depot	San Engr
Stilson, Adlen E	Lt Col	Hq 10th Army Med Sec	San Engr
#Suplee, Frank L, Jr	Major	148th Gen Hosp	Hosp Insp
Swenson, John P	Capt	115th Mal Contr Det	San Engr & C.O.
Wagner, Raymond F	1st Lt	176th Mal Contr Det	San Engr

SANITARY CORPS OFFICERS IN THE POA, CLASSIFIED
AS SANITARY ENGINEERS (7960) (Cont'd)

<u>NAME</u>	<u>GRADE</u>	<u>ORGANIZATION</u>	<u>PRESENT DUTY</u>
Walker, James K	Capt	78th Mal Contr Det	C.O.
Warren, George A	1st Lt	13th Repl Depot	San Engr
#Watkins, Williams W	Capt	218th Gen Hosp	Dy Unasgd

- * Sanitary Engineers assigned to organizations whose T/O or T/A does not authorize any Sanitary Corps Officers.
- # Sanitary Engineers assigned to organizations whose T/O or T/A does not authorize the assignment of a Sanitary Engineer (7960)
- * Sanitary Engineers assigned to overhead organizations whose T/A does not specify the classification of the Sanitary Corps officers authorized

Towne, Wilson W	Major	13th Repl Depot	Atchd Unasgd
Woodward, Frank L	Major	13th Repl Depot	Atchd Unasgd

WESTERN PACIFIC BASE COMMAND

<u>UNIT</u>	<u>SANITARY CORPS</u>	<u>OFFICER</u>	<u>SANITARY ENGINEER</u> (7960)
	<u>Autzd</u>	<u>Asgd</u>	<u>Autzd</u>
5th Conv Hosp	0	1	0
39th Gen Hosp	2	3	0
148th Gen Hosp	3	3	0
204th Gen Hosp	3	3	0
232nd Gen Hosp	2	2	0
48th Sta Hosp	1	1	0
109th Sta Hosp	1	1	0
137th Sta Hosp	1	0	0
176th Sta Hosp	1	1	0
115th Mal Contr Det	1	1	1
217th Mal Surv Det	2	2	0
369th Sta Hosp	1	1	0
373rd Sta Hosp	1	1	0
374th Sta Hosp	1	1	0
AGF, APO 86	1	1	1
AGF, APO 247	0	1	0
81st Med Gp	0	1	0
821st Hosp Ctr	2	2	1
<hr/>	<hr/>	<hr/>	<hr/>
TOTAL	23	26	3
			6

Incl 3

REPLACEMENT TRAINING COMMAND

<u>UNIT</u>	<u>SANITARY CORPS</u>	<u>OFFICERS</u>	<u>SANITARY ENGINEER</u> (7960)	
	<u>Autzd</u>	<u>Asgd</u>	<u>Autzd</u>	<u>Asgd</u>
Hq, 13th Repl Depot	1	1	1	1
Hq, 23rd Repl Depot	1	1	1	1
Hq, 25th Repl Depot	1	1	1	1
Atchd Unasgd 13th Repl Depot	4	0	0	0
Atchd Unasgd Det of Patients	1	0	0	0
TOTAL	8	3	3	3

Incl 3

PACIFIC OCEAN AREA

<u>UNIT</u>	<u>SANITARY CORPS</u>		<u>OFFICERS</u>		<u>SANITARY ENGINEER</u>	
	<u>Autzd</u>	<u>Asgd</u>	<u>Autzd</u>	<u>Asgd</u>	<u>Autzd</u>	<u>Asgd</u>
HPOA	3		2		#	1
5th Med Det (Museum & Arts)	1		1		0	0
18th Med Gen Lab	14		12		2	2
6261st School of Prev Med	7		0		1	0
	—		—		—	—
TOTAL	25		15		##3	3

Overhead organizations whose Table of Allotment does not specify the classification of the Sanitary Corps officers authorized.

Six (6) Sanitary Engineers (7960) are assigned to overhead organizations whose Table of Allotment does not specify the classification of the Sanitary Corps officers authorized.

CENTRAL PACIFIC BASE COMMAND

<u>UNIT</u>	<u>SANITARY CORPS</u>	<u>OFFICERS</u>	<u>SANITARY ENGINEER</u>	
	<u>Autzd</u>	<u>Asgd</u>	<u>Autzd</u>	<u>Asgd</u>
147th Gen Hosp	3	2	0	0
218th Gen Hosp	3	4	0	1
219th Gen Hosp	3	3	0	0
317th Gen Hosp	2	2	0	0
318th Gen Hosp	2	2	0	0
22nd Sta Hosp	1	0	0	0
527th Mal Contr Det	1	1	1	1
604th Mal Surv Det	2	2	0	0
605th Mal Surv Det	2	2	0	0
606th Mal Surv Det	2	2	0	0
607th Mal Surv Det	2	2	0	0
Ha, CPBC, Surg O	3	4	#	1
Schofield Disp #2	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>
TOTAL	27	27	#2	4

Overhead organization whose Table of Allotment does not specify the classification of the Sanitary Corps officers authorized.

Six (6) Sanitary Engineers (7960) are assigned to overhead organizations whose Table of Allotment does not specify the classification of the Sanitary Corps Officers authorized.

Incl 3

SOUTH PACIFIC BASE COMMAND

<u>UNIT</u>	<u>SANITARY CORPS</u>		<u>OFFICERS</u>		<u>SANITARY ENGINEER</u> (7960)	
	<u>Autzd</u>	<u>Asgd</u>	<u>Autzd</u>	<u>Asgd</u>	<u>Autzd</u>	<u>Asgd</u>
78th Mal Contr Det	1	1	1	1	1	1
201st Mal Surv Det	2	2	2	0	0	0
203rd Mal Surv Det	2	2	2	0	0	0
415th Mal Surv Det	2	2	2	0	0	0
420th Mal Surv Det	2	2	2	0	0	0
442nd Mal Surv Det	2	2	2	0	0	0
443rd Mal Surv Det	2	1	2	0	0	0
444th Mal Surv Det	2	2	2	0	0	0
445th Mal Surv Det	2	2	2	0	0	0
446th Mal Surv Det	2	2	2	0	0	0
HSPBC	3	2	2	#	2	2
QM Sec, Isl Comd, APO 502	1	1	1	#	0	0
Hq, Isl Comd, APO 708	3	2	2	#	1	1
Hq, Isl Comd, APO 709	2	2	2	#	1	1
24th Mal Contr Det	1	1	1	1	1	1
36th Mal Contr Det	1	1	1	1	1	1
39th Mal Contr Det	1	1	1	1	1	1
40th Mal Contr Det	1	1	1	1	1	1
41st Mal Contr Det	1	1	1	1	1	1
74th Mal Contr Det	1	1	1	1	1	1
75th Mal Contr Det	1	1	1	1	1	1
76th Mal Contr Det	1	1	1	1	1	1
6th Med Lab	4	4	4	0	0	0
68th Med Depot Co	<u>3</u>	<u>3</u>	<u>0</u>			
TOTAL	43		40	##9		13

Overhead organizations whose Table of Allotment does not specify the classification of the Sanitary Corps officers authorized.

##Six (6) Sanitary Engineers (7960) are assigned to overhead organizations whose Table of Allotment does not specify the classification of the Sanitary Corps officers authorized.

TENTH ARMY

<u>UNIT</u>	<u>SANITARY CORPS</u>	<u>OFFICERS</u>	<u>SANITARY ENGINEER</u> (7960)	
	<u>Autzd</u>	<u>Asgd</u>	<u>Autzd</u>	<u>Asgd</u>
8th Gen Hosp	2	2	0	0
20th Sta Hosp	1	1	0	0
31st Sta Hosp	1	1	0	0
122nd Sta Hosp	1	1	0	1
122nd Mal Contr Det	1	1	1	1
176th Mal Contr Det	1	1	1	1
177th Mal Contr Det	1	1	1	1
214th Mal Surv Det	2	2	0	0
219th Mal Surv Det	2	2	0	0
Hq, 10th Army, Med Sec	2	2	2	2
XXIV Corps, Surg O	0	1	0	0
AGF, APO 245	1	1	1	1
AGF, APO 458	1	1	1	1
7th Inf Div	0	1	0	1
96th Inf Div	0	1	0	1
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TOTAL	16	19	7	10

Incl. 3

APO 331

<u>UNIT</u>	<u>SANITARY CORPS</u>	<u>OFFICERS</u>	<u>SANITARY ENGINEER</u> (7960)	
	<u>Autzd</u>	<u>Asgd</u>	<u>Autzd</u>	<u>Asgd</u>
29th Gen Hosp	2	2	0	0
233rd Gen Hosp	2	1	0	0
9th Sta Hosp	1	0	0	0
27th Sta Hosp	1	1	0	0
75th Sta Hosp	1	1	0	0
156th Sta Hosp	1	0	0	0
175th Mal Contr Det	1	1	1	1
215th Mal Surv Det	2	2	0	0
216th Mal Surv Det	2	2	0	0
221st Mal Surv Det	2	2	0	0
222nd Mal Surv Det	2	2	0	0
32nd Med Hosp Ctr	2	1	1	1
14th Med Lab	4	5	0	0
719th Sanitary Co	3	3	0	1
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
TOTAL	26	23	2	3

Incl 3

IX CORPS

<u>UNIT</u>	<u>SANITARY CORPS</u>	<u>OFFICERS</u>	<u>SANITARY ENGINEER</u> (7960)
	<u>Autzd</u>	<u>Asgd</u>	<u>Autzd</u>
AGF, APO 457	<u>1</u>	<u>1</u>	<u>1</u>
TOTAL	<u>1</u>	<u>1</u>	<u>1</u>

Incl 3

SANITARY CORPS OFFICERS IN THE POA, CLASSIFIED AS
SANITARY ENGINEERS (7960)

WESTERN PACIFIC BASE COMMAND

<u>NAME</u>	<u>GRADE</u>	<u>ORGANIZATION</u>	<u>PRESENT DUTY</u>
\$Bogren, George R.	Capt	81st Med Grp	Asst Med Insp
%Fulmer, Frank E.	Capt	204th Gen Hosp	Asst Med Insp
Hagberg, Ralph A.	Capt	AGF APO 86	San Engr
\$Holtje, Ralph H.	Capt	AGF APO 247	San Engr
%Suplee, Frank L., Jr.	Major	148th Gen Hosp	Hosp Insp
Swenson, John P.	Capt	115th Mal Contr Det	San Engr & C.O.

\$Sanitary Engineers assigned to organizations whose T/O or T/A does not authorize any Sanitary Corps Officers.

%Sanitary Engineers assigned to organizations whose T/O or T/A does not authorize the assignment of a Sanitary Engineer (7960).

SANITARY CORPS OFFICERS IN THE POA, CLASSIFIED AS
SANITARY ENGINEERS (7960)

REPLACEMENT TRAINING COMMAND

<u>NAME</u>	<u>GRADE</u>	<u>ORGANIZATION</u>	<u>PRESENT DUTY</u>
Cranford, Charles A.	Capt	25th Repl Dept	
Spies, Wilbert E.	Capt	Hq 23d Rep Depot	San Engr
Warren, George A.	1st Lt	13th Repl Depot	San Engr
Towne, Wilson W.	Major	13th Repl Depot	Atchd Unasgd
Woodward, Frank L.	Major	13th Repl Depot	Atchd Unasgd

SANITARY CORPS OFFICERS IN THE POA, CLASSIFIED AS
SANITARY ENGINEERS (7960)

PACIFIC OCEAN AREA

<u>NAME</u>	<u>GRADE</u>	<u>ORGANIZATION</u>	<u>PRESENT DUTY</u>
Ahlgren, Clarence L.	1st Lt	18th Med Gen Lab	Ch of Sn Chem Sec
Connell, Cecil H.	Lt Col	18th Med Gen Lab	Ch of Chem Branch
#Gregory, Robert H.	Major	HPOA	San Engr

Sanitary Engineers assigned to overhead organizations whose T/A does not specify the classification of the Sanitary Corps officers authorized.

Incl 3

SANITARY CORPS OFFICERS IN THE POA, CLASSIFIED AS

SANITARY ENGINEERS (7960)

CENTRAL PACIFIC BASE COMMAND

<u>NAME</u>	<u>GRADE</u>	<u>ORGANIZATION</u>	<u>PRESENT DUTY</u>
Bartlett, Joseph K.	1st Lt	527 Mal Contr Det	CO San Engr
Komline, Thomas R.	1st Lt	Schofield Disp #2	Med Insp, San Officer
#Matsinger, George H.	Major	Hq CPBC, Surg O	San Engr
%Watkins, Williams W.	Capt	218th Gen Hosp	Dy Unasgd

Sanitary Engineers assigned to overhead organizations whose T/A does not specify the classification of the Sanitary Corps officers authorized.

% Sanitary Engineers assigned to organizations whose T/O or T/A does not authorize the assignment of a Sanitary Engineer (7960).

SANITARY CORPS OFFICERS IN THE POA, CLASSIFIED AS
SANITARY ENGINEERS (7960)

SOUTH PACIFIC BASE COMMAND

<u>NAME</u>	<u>GRADE</u>	<u>ORGANIZATION</u>	<u>PRESENT DUTY</u>
#Colvin, Dean E.	Capt	Hq Isl Comd, APO 708	San Insp. Asst Med Insp
Cronin, John J.	Capt	74th Mal Contr Det	San Engr
Crowell, Henry B.	Capt	24th Mal Contr Det	San Engr
#Gahr, William N.	Capt	QM Sec. Isl Comd APO 502	San Officer
Harrison, Eugene O.	Capt	40th Mal Contr Det	San Engr
Hilton, Roger R.	Capt	76th Mal Contr Det	C.O. San Engr
Joseph, Edwin B.	Capt	39th Mal Contr Det	C.O. San Engr
Kaufman, Arthur W.	Capt	75th Mal Contr Det	Med Unit C.O. San Engr
#Larson, Keith D.	Capt	HSPBC, APO 502	Asst San Off
Pfeiffer, Frederic R.	Capt	41st Mal Contr Det	San Engr
Schaefer, Edward W.	Capt	36th Mal Contr Det	San Engr
#Scott, Ralph H.	Major	Hq Isl Comd APO 709	Office Exec (Asst Med Insp)
Walker, James K.	Capt	78th Mal Contr Det	C.O.

Sanitary Engineers Assigned to overhead organization whose T/A does not specify the classification of the Sanitary Corps officers authorized.

Incl 3

SANITARY CORPS OFFICERS IN THE POA, CLASSIFIED AS
SANITARY ENGINEERS (7960)

TENTH ARMY

<u>NAME</u>	<u>GRADE</u>	<u>ORGANIZATION</u>	<u>PRESENT DUTY</u>
Barrett, Max L.	Capt	Hq 10th Army Surg O	San Engr (Asst)
Jannett, Anthony V.	1st Lt	177th Mal Contr Det	San Engr
	III		
\$Jones, Kermit E.	Major	7th Inf Div	Med Insp
Meyer, Fred H.	1st Lt	AGF APO 245	Sn O
Nally, Harvey D., Jr.	1st Lt	AGF APO 458	
%Piner, Raymond E.	Capt	122nd Sta Hosp	Med Insp
Randow, Melvin H.	1st Lt	122nd Mal Contr Det	San Engr
Stilson, Alden E.	Lt Col	Hq 10th Army Med Sec	San Engr
Wagner, Raymond F.	1st Lt	176th Mal Contr Det	San Engr
Walker, Vernon L.	Major	96th Div	Med Insp

\$ Sanitary Engineers assigned to organizations whose T/O or T/A does not authorize any Sanitary Corps officers.

% Sanitary Engineers assigned to organizations whose T/O or T/A does not authorize the assignment of a Sanitary Engineer (7960).

Incl 3

SANITARY CORPS OFFICERS IN THE POA, CLASSIFIED AS
SANITARY ENGINEERS (7960)

APO 331

<u>NAME</u>	<u>GRADE</u>	<u>ORGANIZATION</u>	<u>PRESENT DUTY</u>
Campbell, Elmer W.	Capt	32nd Med Hosp Ctr	San Engr
%Croley, Donald R.	1st Lt	719th San Co	Med Unit C.O.
Pollard, Robert T.	1st Lt	175th Mal Contr Det	San Engr

% Sanitary Engineers assigned to organizations whose T/O or T/A does not authorize the assignment of a Sanitary Engineer (7960).

Incl 3

SANITARY CORPS OFFICERS IN THE POA, CLASSIFIED AS
SANITARY ENGINEERS (7960)

IX CORPS

<u>NAME</u>	<u>GRADE</u>	<u>ORGANIZATION</u>	<u>PRESENT DUTY</u>
Mitchell, Desso T.	Capt	AGF APO 457	San Engr

s/ R. H. Gregory
R. H. GREGORY
Major, Sanitary Corps
Sanitary Consultant

A TRUE COPY:

s/ Charles D. Buss
CHARLES D. BUSS
1st Lt, SnC

Incl 3

MDS

ARMY SERVICE FORCES
Office of The Surgeon General
Washington 25, D. C.

15 November 1944. 

MEMORANDUM TO: General J. M. Willis

Subject: Sanitary Engineering Plan and Organization for POA.

1. Following our recent discussion on the above subject, it seems desirable to outline in more precise detail my suggestions for an effective plan and organization to meet the sanitary engineering problems of your Theater. We will send you our best man, but if he is to handle these problems most efficiently he must have responsibility and authority for necessary administrative, planning and technical functions; it is understood that, in discharging these functions, the sanitary engineer will act under the Theater Surgeon and through your Chief of Preventive Medicine.

2. Administrative functions are essential for coordinated and effective prosecution of the work, including:

a. Organization. - (1) Responsibility for all sanitary engineering functions under the Theater Surgeon.

(2) Responsibility through proper command and medical channels for the technical coordination of sanitary engineering in the Theater; and for technical supervision, under the Theater Surgeon, of Base Command sanitary engineers.

b. Personnel. - (1) Responsibility for recommending sanitary engineers and entomologists for major assignments.

(2) Consultation regarding promotion of Sanitary Corps personnel.

c. Liaison. - Responsibility for maintaining necessary liaison, under general supervision, on sanitary engineering matters with other agencies, including

Corps of Engineers
Civil Affairs Division
Transportation Corps
Army Air Forces
Tactical Units
Chemical Warfare Service

Incl 4

U. S. Navy
U. S. Public Health Service
Local Health Departments
Provost Marshal General

3. Planning.- Since sanitary engineering can not operate adequately on a piecemeal or patchwork basis, the sanitary engineer should be

- (a) Consulted in all stages of planning, to permit timely advice and action in regard to sanitary engineering.
- (b) Responsible for planning and cooperation with other agencies, as the Corps of Engineers, to insure that water treatment, waste disposal, and similar installations, for both field and fixed installations, meet health needs.
- (c) Advisory and consultative to other Medical Department organization on sanitary engineering, including Hospitalization, Malaria Control, Operations, Occupational Health and Epidemiology.

4. Technical.- Sound policies, representing safe practices in sanitary engineering, and their skilled application, are essential. The sanitary engineer should be responsible for

- (a) Recommendations for sanitary engineering policies.
- (b) The provision throughout the Theater of adequate engineering advice and service in regard to water supply, sewage, refuse, the engineering phases of mosquito and other insect control, rodent control, swimming pools as affecting health, port and ship water supply and purification, and water and sewage defects in buildings occupied by the Army.

5. Essentially the same organization, on a scale according to local needs, should be provided in each Base Command with a qualified engineer on the staff of each Base Surgeon.

6. I hope that your sanitary engineering organization can function in exactly the same way that this office has functioned under General Simmons, with freedom to take necessary action within the general framework of established policy, and with responsibility for recommending needed measures. In fact, the above outline closely parallels our organization and responsibility here. I have discussed this memorandum

Incl 4

with Lt. Colonel Ward, who concurs in it. I am naturally extremely anxious that our sanitary engineering organization in the POA operates most efficiently. Whatever we can do to help will be a privilege.

s/ W. A. Hardenbergh,
t/ W. A. HARDENBERGH,
Colonel, Sanitary Corps,
Director,
Sanitary Engineering Division.

A TRUE COPY:

s/ Charles D. Buss
CHARLES D. BUSS
1st Lt, SnC.

Incl 4

27 August 1945

NAME AND LOCATION OF INSTALLATION	MEAN STRENGTH	SOURCE OF WATER	CHLORI- NATED	METHOD OF CHLORINATION	BY WHOM
Ft Armstrong	1000	HWSS	Yes	CL	HWSS
Ft DeRussy	1050	HWSS	Yes	CL	HWSS
Ft Hase	11976	SWS	Yes	HCL	SWS
Ft Kamehameha	9000	Navy	Yes	CL	Army
Aiea Staging Area	5000	Aiea Pln	Yes	CL	Navy
Camp Malakole	2300	Ewa Pln Well	Yes	HCL	Army
Ft Ruger	972	HWSS	Yes	CL	HWSS
Sand Island	6500	HWSS	Yes	CL	HWSS
Ft Shafter	5889	HWSS	Yes	CL	HWSS
Schofield Barracks	43900	Army Well Deep Well Reservoir Village of Wahiawa	Yes Yes Yes	CL CL CL	Army Army Army Village of Wahiawa
Kahuku RCT	5600	Army Well	Yes	CL	Army
Heeia RCT	4500	SWS	Yes	HCL	SWS
Pali RCT	5600	SWS	Yes	CL	SWS
Kalihi Camp	4000	HWSS	Yes	CL	HWSS
Kaiaka Bay ATC	880				
Waianae ATS	1200	Waianae Pln Tunnel	Yes Yes	HCL HCL	Waianae Pln Army
Pacific Combat Training Command	4500	SWS	Yes	HCL	SWS
Waimanalo ATS	1400	SWS	Yes	HCL	SWS
Koko Head ATC	3000	HWSS	Yes	HCL & CL	HWSS
Eucalyptus FAT	977	Ewa Pln Ditch	Yes	HCL	Army
<u>ORDNANCE:</u>					
Hawaiian Ordn Depot King St	551	HWSS	Yes	CL	HWSS
Makalapa Crater	190	Aiea Pln Ditch	Yes	Hand	Army
Waiau Valley	157	Ewa Pln			
Ewa	157	Well	Yes	CL	Army

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NAME AND LOCATION OF INSTALLATION	MEAN STRENGTH	SOURCE OF WATER	CHLORI- NATED	METHOD OF CHLORINATION	BY WHOM
Aliamanu Crater	476	Wells	Yes	HCL	Army
Damon Estate	162	HWSS	Yes	HCL	HWSS
Camp Malakole	179	Ewa Pln Well	Yes	HCL	Army
Moanalua Gardens	115	HWSS	Yes	CL	HWSS
<u>QUARTERMASTER:</u>					
Puuhale St (Nr Oahu Prison)	981	HWSS	Yes	CL	HWSS
School & Gulick Sts	165	HWSS	Yes	CL	HWSS
Atkinson Park (Illa & Haula Sts)	606	HWSS	Yes	CL	HWSS
Emerson & Lunalilo Sts	180	HWSS	Yes	CL	HWSS
Pali Supply Point	164	SWS	Yes	CL	SWS
<u>ENGINEERS:</u>					
2913th Engr Sv Bn (Schofield)	1000	Village of Wahiawa	Yes	CL	Village of Wahiawa
3190th Engr Sv Bn, (Punchbowl Camp)	100	HWSS	Yes	CL	HWSS
102d Base Yard, (ala Moana)	100	HWSS	Yes	CL	HWSS
<u>PROVOST MARSHALL:</u>					
Kunia	140	Wells	Yes		
Kipapa	100				
Pearl City	350	SWS	Yes	CL	SWS
Immigration Station	300	HWSS	Yes	CL	HWSS
POW Compounds #6, #8, & #9	4000	Ewa Pln Well	Yes	HCL	Army
<u>HSAC:</u>					
2274th Hq Bn, (Black Pt)	110	HWSS	Yes	CL	HWSS
612th CA Bn, (Kualoa Port)	105	SWS	Yes	CL	SWS

Incl 5

NAME AND LOCATION OF INSTALLATION	MEAN STRENGTH	SOURCE OF WATER	CHLORI- NATED	METHOD OF CHLORINATION	BY WHOM
54th CA, Btry "A" (Salt Lake)	124	HWSS	Yes	CL	HWSS
<u>MEDICAL SERVICE:</u> Old Tripler General Area	1639	HWSS Army Well	Yes Yes	CL CL	HWSS Army
219th(Kam Area) GH	361	HWSS	Yes	CL	HWSS
219th(Far Area) GH	442	HWSS	Yes	CL	HWSS
435th Amb Bn	206	HWSS	Yes	CL	HWSS
22d Station Hospital	755	Waihole Ditch	Yes	HCL	Army
113th Med Sv Co (Vet)	148	HWSS	Yes	CL	HWSS
8th SH, incl. Patients & 18th Med Gen Lab	899	Waihole Ditch	Yes	HCL	Army
230th SH, incl. Patients	397	SWS Terr. Hosp	Yes Yes	HCL HCL	SWS Terr. Hosp
Koko Head MDCC	388	HWSS	Yes	USED CL CL & HCL	HWSS
<u>AIR FORCE:</u>					
Bellows Field	2529	SWS	Yes	HCL	SWS
Kualoa Field	167	SWS	Yes	HCL	SWS
Hickam Field	11146	Navy	Yes	CL	Navy
Camp Barrette	129	Army Well	Yes	HCL	Army
John Rodgers Air Port	1722	Navy	Yes	CL	Navy
Wheeler Field	5345	Deep Well Reservoir	Yes	CL	Army
Kipapa Field	362	Waihole Ditch	Yes	HCL	Army
Mokuleia Field	2125	Army Well	Yes	HCL	Army
Haleiwa Field	304	SWS	Yes	HCL	SWS
Kahuku Field	2552	Army Well	Yes	HCL	Army
<u>SIGNAL CORPS:</u>					
School & Lanakila Sts	994	HWSS	Yes	CL	HWSS
Helemano Crater	494	Navy Village of Wahiawa	Yes	HCL HCL	Navy Village of Wahiawa

NAME AND LOCATION OF INSTALLATION	MEAN STRENGTH	SOURCE OF WATER	CHLORINATED	METHOD OF CHLORINATION	BY WHOM
Koko Head	136	HWSS	Yes	CL & HCL	HWSS
King & Umi Sts	122	HWSS	Yes	CL	HWSS
King & Middle Sts	2006	HWSS	Yes	CL	HWSS
<u>HAAAC</u>					
48th Brig (Aiea Hgts)	100	SWS	No		
28th AAA Gp (Moanalua Gardens)	100	HWSS	Yes	CL	HWSS
96th AAA Gun Bn (KNAS)	500	SWS	Yes	HCL	SWS
877th AAA Gun Btry (Camp Malakole)	100	Ewa Pln Well	Yes	HCL	Army
750th AAA Gun Bn (Moiliili Quarry)	100	HWSS	Yes	CL	HWSS
750th AAA Gun Bn (Punch-bowl)	400	HWSS	Yes	CL	HWSS
878th AAA Gun Btry (Sand Island)	100	HWSS	Yes	CL	HWSS
879th AAA Gun Btry (Ala Moana)	100	HWSS	Yes	CL	HWSS
139th AAA Gun Gp (Waipahu)	100				
516th AAA Gun Bn (Aiea)	150	SWS	No		
516th Btry "A" (Waipo Peninsula)	100				
516th Btry "B" (Waipahu High School)	100				
516th Btry "C" (Camp Catlin)	100	Navy	Yes No	CL	Navy
516th Btry "D" (Red Hill)	100				
753d AAA Gun Bn (Waimea)	500				
754th AAA Gun Bn (Aiea)	100	SWS	No		
754th Btry "A" (Aliamanu Crater)	100	Army Well	Yes	HCL	Army

Incl 5

RESTRICTED

NAME AND LOCATION OF INSTALLATION	MEAN STRENGTH	SOURCE OF WATER	CHLORI- NATED	METHOD OF CHLORINATION	BY WHOM
754th Btry "B" (Waiau)	100				
754th Btry "C" (Makalapa Crater)	100	Aiea Pln Ditch	Yes	Hand	Army
754th Btry "D" (Ewa Junction)	100	Navy	No		

CODE:

HWSS - Honolulu Water Supply System

SWS - Suburban Water Supply

Pln - Plantation

CL - Gas Chlorinator

HCL - Hypochlorinator

Incl 5

TERRITORY OF HAWAII
OFFICE OF THE MILITARY GOVERNOR
IOLANI PALACE
HONOLULU, T. H.

7 November 1942

GENERAL ORDERS)
NO. 154)

CHLORINATION OF WATER SUPPLIES, TERRITORY OF HAWAII.--1. It is imperative under conditions now prevailing in this Territory to protect the public health in every way possible. Continuous and strict compliance with the Territorial laws and Board of Health rules promulgated thereunder relating to the prevention of disease is required of everyone and is directed.

2. The control and prevention of water-borne disease caused by pathogenic organisms in the water supply of a community is essential at any time, and especially under present conditions.

3. To assure the attainment of this objective, and supplementing the requirements referred to in paragraph 1, additional control measures are ordered as follows:

a. The water supplies of the civilian communities and military posts, camps and other installations listed in paragraph 4 will be chlorinated, employing methods and equipment now generally accepted as standard in the field of public health.

b. Standard mechanical equipment for this purpose will be ordered by the Department Engineer from the mainland without delay, and will be installed promptly upon receipt by the Department Engineer.

c. As a temporary expedient and until the arrival of the equipment referred to in section b of this paragraph, chlorination will be instituted as soon as practicable, utilizing materials and apparatus which can be procured locally and at small cost. If necessary, the cost of such equipment may be prorated among consumers and added to their usual statements for water service.

d. The operation and proper performance of chlorination in any water system will be the responsibility of the owners of that system; however, the military authorities will give assistance and supervision as necessary.

Incl. 6

4. In accordance with the provisions of the preceding paragraphs, continuous chlorination is ordered for the water supplies and systems of the following communities and military installations: (names of systems deleted).

By order of the Military Governor:

(Signed) Thomas H. Green,
THOMAS H. GREEN,
Brigadier General, A.U.S.
Executive

A TRUE COPY:

(Signed) Charles D. Buss
CHARLES D. BUSS
1st Lt, SnC

Incl. 6

Headquarters U. S. Army Forces, Pacific Ocean Areas

Inter-Staff Routing Slip

For use in all inter-office correspondence. Separate each Memorandum by a line and initial. Memorandum will preferably be typewritten.

SUBJECT: Chlorination of Honolulu water.

Memo. No.	Date	From	To	Memorandum
				<p>NOTE:</p> <p>1st Route Slip signed by General Richardson requests question of chlorination of water in Honolulu be studied with Board of Health. (No need to copy).</p> <p>s/ T. W. THOMAS G. HARD Lt Col, MC Assistant.</p>
2	7 July 1945	Surg	CG	<p>1. A conference was held with the President, Board of Health, Territory of Hawaii at which time the question of chlorination for the Honolulu city water supply was discussed</p> <p>2. It developed during this conference that all of the Honolulu water is not of Artesian source. Approximately 8% comes from mountain sources, (tunnels and springs) shown as red dots on the attached map. This water is subject to contamination and may pollute the entire distribution system.</p> <p>3. I believe that all public water supplies should be chlorinated, regardless of the source, as the distribution system may be polluted by back siphonage of sewers or cross connections between the sewer and the water system.</p> <p>4. The President of the Board of Health agrees and desires to continue the chlorination of the Honolulu city water supply. Many soldiers drink this supply of water.</p> <p>5. It is recommended that the policy of chlorination of the Honolulu city water supply be continued.</p> <p>1 Incl: Map of City of Honolulu Water Supply System. JOHN M. WILLIS Brigadier General, U. S.A. Surgeon.</p> <p><i>incl.?</i></p> <p><u>TRUE COPY:</u> Charles D. Buss CHARLES D. BUSS Captain, S.A.C.</p>

SECTION 5

NUTRITION

NUTRITION

GENERAL.

The Armed Forces Middle Pacific Surgeon's responsibilities toward the nutritional health of the troops during the war were implemented principally by the nutritional activities of the surgeons and medical inspectors of lower echelons and units. The latter were charged under AR 40-200, Ltr. WD AG 430.2 (1-1-42) MO-D-M, Subj: "Improvement of the Nutrition of Troops," and AR 40-250 with supervising a program which included determining the nutritional state of the troops, determining the adequacy of the menus and consumed food, assisting in supervising the cooking done by the men, and the prevention of nutritional deficiencies.

The monthly Sanitary Reports, reviewed by this headquarters, usually included statements on the preparation of food, the adequacy of the food supply, and the nutritional state of the troops in their units. Only in rare instances were these factors in proper nutrition reported as unsatisfactory. Intermediate echelons added endorsements in practically all such cases outlining corrective action being taken.

To emphasize the importance of constant checking of rations and feeding by Medical Department officers, Armed Forces Middle Pacific Circular No. 20, Section III, 12 August 1945, was promulgated.² It outlined specific steps to be taken by medical personnel to assure that the food ultimately consumed by the troops met the levels needed for best nutritional health.

NUTRITION SURVEYS — APRIL TO JUNE 1945.

To collect specific data on the nutritional condition of troops in the theater, a survey project was outlined in October 1944. On 1 November 1944 action was instituted to request a survey team from The Surgeon General's Office.³ In February 1945 the project was recapitulated in a letter to the Surgeon from the Chief, Preventive Medicine Branch.⁶

It was proposed to include in the survey a physical examination directed especially toward possible abnormalities due to nutritional deficiencies, laboratory study of certain biochemical factors in the body influenced by nutrition, and dietary surveys of representative messes. The need for any correction of food supply was to be determined. Comprising the survey team were to be medical and nutrition officers and laboratory technicians experienced in rapid survey techniques.

In a preliminary investigation to select suitable areas for the survey, the Director, Nutrition Division, Office of The Surgeon General, Colonel John B. Youmans, MC, and Dr. Joseph T. Wearn, Consultant to The Surgeon General, visited installations on Oahu, Hawaii, Saipan, Guam, Angaur, Guadalcanal and New Caledonia in May 1945.⁷ At the islands found suitable, arrangements were made for laboratory facilities and other necessary assistance to the survey team.

Observations made in the course of this preliminary tour indicated that monotony in the diet due largely to limited availability of fresh foods was an adverse influence in many places. Together with discrepancies in food preparation affecting both acceptability and nutrient value, this tended to reduce consumption of certain classes of food.

It was felt that while such defects were recognized in many instances and attempts made to correct them, the lack of trained personnel specifically responsible for satisfactory nutrition was a handicap. It was recommended, accordingly, that nutrition officers (SnC MOS 3316) be assigned to Hq POA (Middle Pacific), to Bases, and to installations of suitable size.

The nutrition survey was conducted from 17 April to 12 June 1945 by a team that included a medical officer, a civilian medical consultant, a nutrition officer, and a Quartermaster Corps officer.^{8 9} The latter was included to make a simultaneous study of the ration issue and the condition of subsistence supplies. Five Middle Pacific installations were studied: Hawaii, Guadalcanal, Saipan, Iwo Jima and Guam, including a group of casualties from Okinawa. At each place a representative sample of about fifty men was investigated as to medical history, dietary history, physical stamina, deficiency signs, and biochemical status with respect to whole blood hemoglobin, plasma protein, and urinary excretion of chloride, acetone bodies, and vitamins C, thiamine, and riboflavin.

On the basis of these findings it was reported that at this stage the nutritional status of the troops in the theater was in general satisfactory. Classical deficiency syndromes were not encountered in any group. The possibility of lesser deficiencies in small proportions of the troops at some installations was suggested by scattered physical findings, low basal excretions of vitamins, and intakes of certain nutrients which were below the levels recommended by the National Research Council. The report included, accordingly, that continued supervision and action to correct defects were indicated. As implementation it was recommended that additional nutrition officers be assigned in the theater, and that the Armed Forces Middle Pacific Surgeon and Quartermaster jointly develop and supervise the Food Service Program to the fullest extent.

COMBAT FLYERS ON REST LEAVE.

In mid-1944 a nutritional problem was encountered with combat flyers brought back from forward areas for rest in the Army Air Forces Rest and Recreation Center, APO 953, Oahu. These men had often lost weight under the stresses of their work, and the inadequate caloric intake had undoubtedly been accompanied by lower intakes of vitamins and minerals than usual.¹⁰ To supplement the regular ration for these men, authority was granted in August 1944 for expenditure of funds during six-month periods for the purchase of fresh milk and fruit juices.^{11 12 13} Monthly Sanitary Reports from the rest centers indicated that with few exceptions the nutritional status of the men improved during their stay, with an average weight gain of about five pounds in the ten-day rest period.^{14 15}

PRISONER OF WAR FEEDING.

The Quartermaster, Hq United States Armed Forces, Middle Pacific, recommended in July 1945 that the issue of refrigerated subsistence supply to prisoners of war be discontinued. In interstaff memoranda it was decided that this alteration be effected if it could be assured that wholesome food of nutritional value equal to the American ration could be provided, thereby meeting the provisions of the Geneva Convention as interpreted by Section IV, Army Service Forces Circular 191, 29 May 1945.¹⁶

After consultation with mess personnel at the Italian and Oriental Prisoner of War Compounds, tentative menus were worked out by the Middle Pacific nutrition consultant. Insofar as possible they conformed to the national food habits of the two types of prisoners, a consideration necessary if consumption of food were to be adequate to meet their caloric needs and maintain normal weight. Analysis of the final menus indicated that they would meet the current National Research Council—Surgeon General's Office minimum standards for the United States Army: Protein, 75 gm; calcium 800 mg; iron 12 mg; vitamin A 5000 USP units; thiamine 1.7 mg; riboflavin 2.2 mg; niacin 17 mg; and ascorbic acid 75 mg. Due to the large amount of rice on the Oriental menu it was found necessary to include fresh frozen pork to bring the thiamin level up to the desired allowance; all other items could be supplied from non-refrigerated stocks.

NUTRITION PERSONNEL IN THE THEATER.

In the Preventive Medicine Section, Surgeon's Office, Headquarters, United States Armed Forces, Pacific Ocean Area (Middle Pacific) there was no nutrition consultant prior to 15 May 1945.^{18 19} Of the commands

subordinate to Headquarters, United States Armed Forces, Pacific Ocean Area (Middle Pacific), only the South Pacific Base Command had nutrition officers assigned. As of April 1945 there were two at Headquarters, South Pacific Base Command, APO 502, New Caledonia; one at Headquarters, Island Command, APO 709, Guadalcanal; and one at Headquarters, Island Command, APO 708, Espiritu Santo. These officers had arrived in February as replacements for others transferred to the Southwest Pacific area.⁷

When the 6261st School of Preventive Medicine was activated under Headquarters, United States Armed Forces, Pacific Ocean Area (Middle Pacific) in June 1945, a nutrition officer was assigned as instructor in nutrition.^{20 21} This organization was transferred to Armed Forces, Pacific, in August 1945.²²

CHARLES D. BUSS
1st Lt, SnC
Nutrition Consultant

REFERENCE

1. Writer's personal observation as Nutrition Consultant, Surgeon's Office, Hq., USAFPOA (MIDPAC), fr 15 May 1945.
2. Hq., USAFMIDPAC Circular No. 20, Sec. III, 12 Aug. 1945, subj: "Nutrition of Troops." Attached.
3. Memo to G-4 from Surgeon, Hq., USAFPOA, subj: "Nutrition Survey, Troops, POA," 1 Nov. 1944. Attached.
4. Ltr to the Surgeon from the Chief, Preventive Medicine Branch, Hq., USAFPOA, subj: "Project for Nutritional Group," 27 Feb. 1945, attached.
5. Ltr to the CG, POA, attention the Surgeon, from Col. John B. Youmans, MC, and Dr. Joseph T. Wearn, subj: "Preliminary Report of Survey of Nutrition," 15 May 1945. Attached.
6. Ltr to the CG, AFMIDPAC, thru the Surgeon and the Quartermaster, from Maj. Wm. B. Bean, MC, Capt. Charles R. Henderson, SnC, Dr. Robert E. Johnson, Capt. Lyle M. Richardson, QMC, and Maj. Wm. F. Ashe, Jr., MC, subj: "Nutrition Survey in Army Forces, Middle Pacific," 4 Sept. 1945. Attached.
7. Memorandum for The Surgeon General thru Chief, Preventive Medicine Service, from Maj. Wm. F. Ashe, MC, subj: "Report of Overseas Temporary Duty Assignment," 30 July 1945. Attached.
8. Writer's opinion based on two years' experience analyzing Army dietaries.
9. Ltr Hq., USAFPOA, FIS-112.4, subj: "Augmentation of Ration," 3 August 1944. Attached.
10. Ltr from Hq., AAFPOA, APO 953, to CG, USAFPOA, subj: "Augmentation of Ration," 28 Nov. 1944. Attached.
11. Ltr from Hq., AAFPOA Rest and Recreation Center, APO 953, to CG, USAFPOA, subj: "Augmentation of Ration," 2 June 1945. In MIDPAC AG file 430/364.
12. Ltr from AAFPOA Rest and Recreation Center (Hoonanea and Hooluana), subj: "Monthly Sanitary Report for May 1945," in MIDPAC Surgeon's Office file, Sanitary Report No. 3354. Extract copy attached.

13. Ltr from AAFPOA Rest and Recreation Center, APO 953, subj: "Monthly Sanitary Report for May 1945." In MIDPAC Surgeon's Office file, Sanitary Report No. 3211. Extract copy attached.

14. Hq., USAFMIDPAC Inter-Staff Routing Slip, subj: "Monthly Army Issues of Refrigerated Provisions for Month of June 1945," 12 July 1945. In MIDPAC Surgeon's Office Secret file, 430 FOOD, 1945. Extract copy attached.

15. Special Orders No. 132, Par. 9, Hq., 13th Repl. Depot, APO 969, 12 May 1945. Attached.

16. Special Orders No. 157, Par. 2, Hq., USAFPOA, 6 June 1945. In MIDPAC AG file 300.4.

17. Personnel records, Hq., USAFMIDPAC Surgeon's Office, Form Emergency 169-8506 for: Capt. James F. Nance, SnC, O-526098; 2nd Lt. Robert E. Clegg, SnC, O-526690; 2nd Lt. Sherman G. Davis, SnC, O-527204; and 2nd Lt. Glenn H. Beck, SnC, O-528342.

18. General Order No. 57, Hq., USAFPOA, 2 June 1945. Attached.

19. Table of Distribution, Hq., 6261st, Hq., USAFPOA, 1 June 1945. Attached.

ANNEXES

1. Hq, USAFMIDPAC Circular No. 20, Sec III, 12 Aug 45, subj: "Nutrition of Troops." Attached.

2. Memo to G-4 from Surgeon, Hq, USAFPOA, subj: "Nutrition Survey, Troops, POA," 1 Nov 44. Attached.

3. Letter to the Surgeon from the Chief, Preventive Medicine Branch, Hq, USAFPOA, subj: "Project for Nutritional Group," 27 Feb 45, attached.

4. Letter to the CG, POA, attn the Surgeon, from Col John B. Youmans, MC, and Dr Joseph T. Wearn, subj: "Preliminary Report of Survey of Nutrition," 15 May 45. Attached.

5. Letter to the CG, AFMIDPAC, thru the Surgeon and the Quartermaster, from Maj Wm B. Bean, MC, Capt Charles R. Henderson, SnC, Dr Robert E. Johnson, Capt Lyle M. Richardson, QMC, and Maj Wm F. Ashe, Jr, MC, subj: "Nutrition Survey in Army Forces, MidPac," 4 Sep 45. Attached.

6. Memo for The Surgeon Gen thru Chief, Preventive Med Sv, from Maj Wm F. Ashe, MC, subj: "Report of Overseas Temporary Duty Asgmt," 30 Jul 45. Attached.

7. Letter Hq, USAFPOA, FIS-112.4, subj: "Augmentation of Ration," 3 Aug 44. Attached.

8. Letter from Hq, AAFPOA, APO 953, to CG, USAFPOA, subj: "Augmentation of Ration," 28 Nov 44. Attached.

9. Letter from AAFPOA Rest and Recreation Center (Hoonanea and Hooluana), subj: "Monthly Sanitary Report for May 45," in MidPac Surgeon's Office file, Sanitary Report No. 3354. Extract copy attached.

10. Letter from AAFPOA Rest and Recreation Center, APO 953, subj: "Monthly Sanitary Report for May 1945." In MidPac Surgeon's Office file, Sanitary Report No. 3211. Extract copy attached.

11. Hq, USAFMIDPAC Inter-Staff Routing Slip, subj: "Monthly Army Issues of Refrigerated Provisions for Month of June 45," 12 Jul 45. In MidPac Surgeon's Office Secret file, 430 FOOD, 45. Extract copy attached.

12. Special Orders No. 132, Par 9, Hq, 13th Repl Depot,
APO 969, 12 May 45. Attached.

13. Gen Order No. 57, Hq, USAFPOA, 2 Jun 45. Attached.

14. Table of Distribution, Hq, 6261st, Hq, USAFPOA, 1 Jun
45. Attached.

E X T R A C T

HEADQUARTERS UNITED STATES ARMY FORCES
MIDDLE PACIFIC
APO 958

CIRCULAR)

12 August 1945

NO. 20)

	Section
AUTOMOTIVE DISABILITY	I
MONTHLY REPORT OF CHAPLAINS	II
NUTRITION OF TROOPS.	III

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SECTION III

References:

- (a) AR 40-250, 20 April 1945.
- (b) AR 40-200, 2 November 1944.
- (c) Letter, War Department, AG 430.2 (1-1-42) MO-D-M, 12 January 1942, subject: Improvement of the Nutrition of troops.
- (d) Subparagraph 12c, AR 40-205, 31 December 1942.
- (e) Circular No. 17 (Food Service Program), HUSAPOA, 1945.

NUTRITION OF TROOPS. 1. Attention is directed to reference (a) which defines the responsibilities of Medical Department officers in determining and maintaining the nutritional health of the troops.

2. Nutritional deficiencies, even of latent degree, will reduce the mental and physical effectiveness of the command. The mission of the Medical Department in this respect is to advise in the improvement and the maintenance of the nutritional status of troops at an optimal level under all conditions of service. The purpose of this circular is to clarify the means by which this Medical Department function will be accomplished.

E X T R A C T

ANNEX 1

EXTRACT

3. The surgeon, in order to carry out the nutritional responsibilities of the Medical Department in the unit, and assisted by the medical inspector, will:

a. Determine by periodic inquiries among unit commanders, unit medical personnel, and the troops themselves whether the total quantity of food is sufficient to satisfy appetite and maintain normal weight. If conditions exist whereby the troops, under certain circumstances, reduce the normal food intake, such as combat conditions or limited supplies, weekly weighings of at least ten per cent of the unit personnel will indicate the progress of their general nutritional state.

b. Obtain the assistance of the Nutrition Officer (see AR 40-250), if one is available in the same or a higher echelon, to evaluate the planned menu and also the dietary as actually issued and consumed to determine whether the dietary meets the nutritional requirements of the troops.

c. Maintain liaison with food service supervisors and other officers conducting mess inspections to determine:

- (1) Whether there is full use of the more important foods in the prescribed ration, particularly milk products, leafy green and yellow vegetables, and eggs;
- (2) Whether waste in the messes is reducing the consumption of certain foods excessively;
- (3) Whether the preparation of food is such that it is as palatable and varied as possible to assure acceptance, and that its nutrient values are conserved by avoiding improper storage, over-cooking, and the use of excessive cooking water with vegetables.

d. Maintain liaison with quartermaster subsistence officers to obtain information and to offer advice on the nutritional aspects of the ration. When it is necessary to make substitutions in the planned menu, it is important that nutritionally similar foods be used insofar as possible, i.e., those within the same food group as listed in TB Med 25, 28 March 1944.

EXTRACT

ANNEX 1

E X T R A C T

4. Medical officers who examine troops will be alert to detect any early indications of faulty nutrition. The milder deficiency states, although important to health and efficiency, are seldom manifested by obvious signs. Hence even the sporadic occurrence of detectable cases may be significant in the over-all picture of the command. In mess inspections, particular note will be made of the mess operations which affect the nutrition of the men, as cited in subparagraph 3c (3) above.

5. Dental officers will note and report to their respective surgeons any undue prevalence of Vincent's angina, bleeding gums or other oral disorders to which suboptimal nutrition may contribute.

6. Sanitary reports will reflect the consideration given to the various factors governing the nutrition of the command. They will contain comments on the food supply, including the character of substitutions, on the extent to which food is prepared and served properly in the messes, on the nutritional adequacy of the dietary as consumed, and on the nutritional status of the troops. Appropriate recommendations will be made concerning the correction of any defects.

(POYSG 430)

BY COMMAND OF LIEUTENANT GENERAL RICHARDSON:

CLARK L. RUFFNER
Major General, GSC
Chief of Staff

OFFICIAL:

/s/ Ernest E. McMahon
ERNEST E. McMAHON
Colonel, AGD
Asst. Adjutant General

DISTRIBUTION:

"C"

E X T R A C T

ANNEX 1

1 November 1944

MEMORANDUM FOR G-4:

SUBJECT: Nutritional Survey, Troops, POA.

1. Please note attached memorandum. I think such a survey is highly important on Kwajelein in the Mariannas and Palau Islands.

2. Recommend that the War Department be asked to send such a team. Recommend that the message be worded substantially as follows:

"Request that the Surgeon General furnish a team of experts with full experience who can evaluate the nutritional status of troops by dietary surveys, physical examinations and laboratory tests. This team to be sent to POA on temporary duty to evaluate the nutritional status of troops in the Marshall, Mariannas and Palau Islands of the Central Pacific Area, and certain islands to be selected in the SPBC. Length of stay to be the time necessary to complete the surveys, estimated as not more than six months. It is understood that such a team would probably comprise six officers, with necessary technicians supplied from laboratories now in POA. Request information as to availability of such a team with probable date it can be made available for shipment to POA."

EDGAR KING,
Brig. General, U.S. Army.

1 Incl

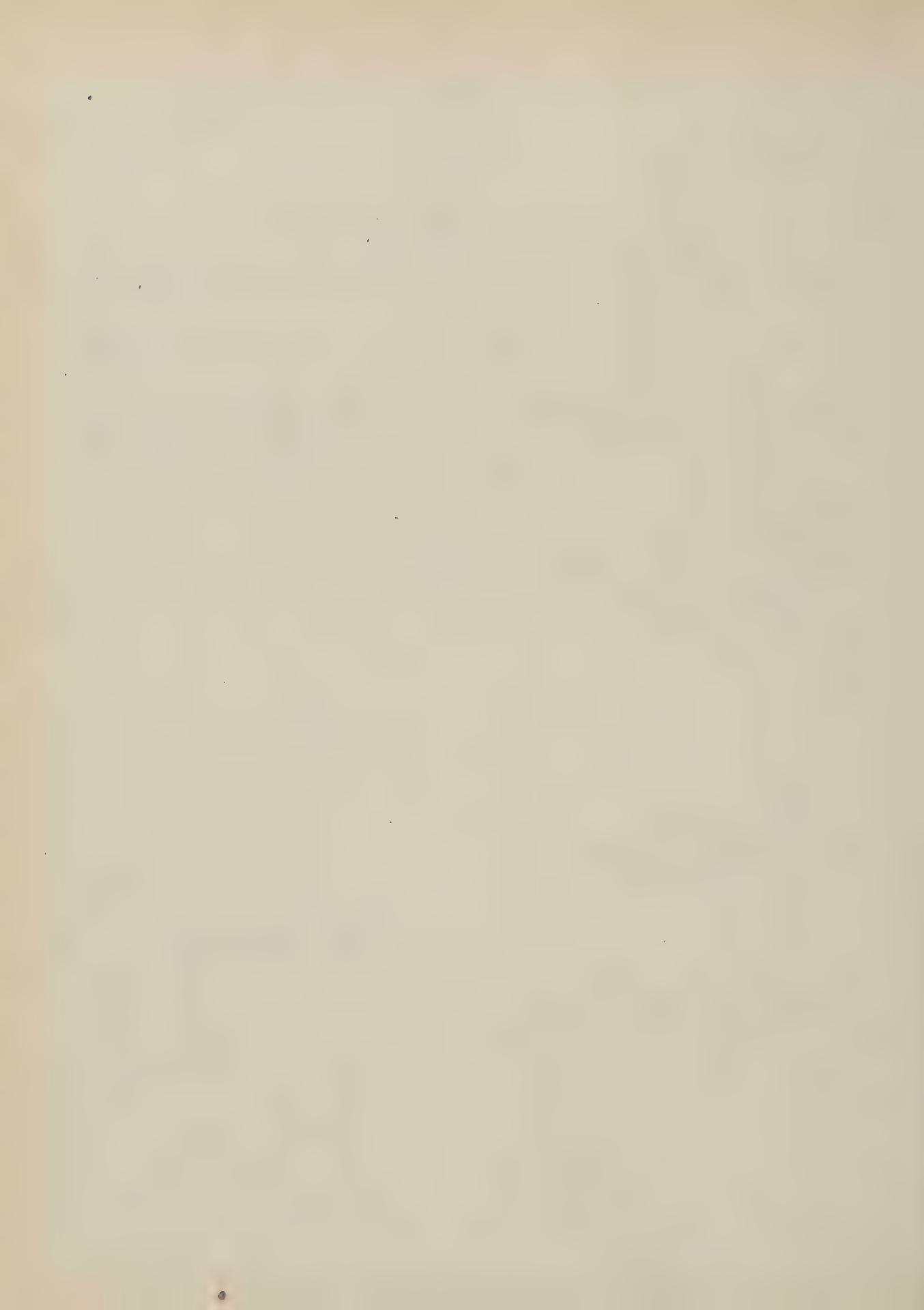
Memo re proposed
procedure for Assessing
the nutritional status
of troops.

COPY FOR:
BRIG. GENERAL KING

A TRUE COPY:

/s/ Charles D. Buss
CHARLES D. BUSS
1st Lt, SnC

ANNEX 2



HEADQUARTERS UNITED STATES ARMY FORCES
PACIFIC OCEAN AREAS
APO 958

In reply refer to:

27 February 1945.

SUBJECT: Project for Nutritional Group.

TO : The Surgeon, HEADQUARTERS USAFPOA, APO 958.

1. In order to provide answers to pertinent questions concerned with the status of nutrition among U. S. Army forces in this theater, the project outlined below is presented for consideration.

a. The following procedures should be accomplished in order to determine the nutritional status of troops, the detection of nutritional deficiencies, if any, the effect of such deficiencies and the measures necessary for their prevention and relief.

- (1) A physical examination to include the following:
 - (a) Age
 - (b) Height
 - (c) Weight
 - (d) Sex
 - (e) Special inspection of the eyes, skin and mucous membranes for the lesions of nutritional deficiencies.
 - (f) Examination of the tendon reflexes and the vibratory sensation of the lower extremities.
 - (g) Evidence of edema of nutritional origin.
 - (h) Such additional observations as may be indicated.
- (2) Laboratory Test.
 - (a) Hemoglobin, total protein and hematocrit should be done by the Van Slyke method on all men

ANNEX 3

examined at the site of the examination. Vitamin C by the colorimetric method. Vitamin B₁ (Thiamin) by the thiochrome method and Vitamin B₂ (Riboflavin) by the microbiological method should be run on urine samples. These samples will be collected at the site of examinations and sent to the 18th Medical General Laboratory for analysis. These samples should be taken on random or selected samples of the troops approximately as follows:

No. of Troops	No. of Troops Examined	No. Specimens for 18th Medical General Laboratory
100	100	100
1000	500	500
10,000	1000	1000
100,000	1500	1500

(3) Dietary Survey Method.

(a) Nutritional surveys of Army messes should cover seven day periods unless conditions warrant a shorter period. In areas where troop activity is constantly the same over extended periods of time an accurate dietary survey might be made in 5 days. This should be accomplished in the following manner:

1. All foods on hand at the beginning of the survey are inventoried.
2. All foods delivered to the mess during the survey are listed as to amount of each by actual weight and item.
3. An inventory is to be made again at the close of the survey.
4. The initial inventory plus the food received minus the foods at the final inventory will give the amounts of each food prepared. Because of food wastage, this figure will not indicate the total amounts of food consumed.

ANNEX 3

5. Amounts of each food wasted is to be obtained by collecting and weighing plate and kitchen waste by items at each meal. These items are reduced to an "as purchased" basis and subtracted from the amounts of food used in meal preparation as computed in No. 4 above. By this method the amount of food consumed on an "as purchased" basis is derived.
6. An accurate count will be made of all personnel actually eating at the mess.
7. By having a record of foods consumed and also of troops eating, it will be possible to arrive at consumption of each food item.
8. The average intake of each food class will be computed on a pounds per man per day basis. The nutrients consumed will then be calculated and compared with known basic requirements of both calories and other nutrients.
9. Throughout the survey observation will be made of the methods used in storage, preparation and cooking as well as serving.
10. While the word "mess" is used above, this procedure is also applicable to a study of food consumption, adequacy and acceptability in troops on emergency or combat rations living in bivouac on perimeter defense, etc. It also is applicable to appraisal of the adequacy of hospital patient feeding, to crews in long bomber flights and to special infantry patrols on extended marches.

(4) Personnel.

- (a) The personnel necessary to such surveys is listed as follows:
 1. One, preferably two, medical officers thoroughly trained in the recognition of nutritional deficiency states.

ANNEX 3

2. Two nutrition officers, SnC, (MOS-3316) with experience in nutrition (mess) surveys.
3. Two thoroughly trained laboratory technicians familiar with rapid survey techniques and their use in the field.
4. Personnel listed in 1 and 2 furnished by SGO; 3 furnished by POA.

(b) Such a unit alone could do surveys of the nutritional status of troops at rates of upwards of 1000 men a week. With the aid of local mess officers, additional medical men from local sources and clerical help this rate could be tripled or quadrupled but one week would elapse in training such personnel before an intensive survey began. In large areas it is not necessary to examine every man. Statistical samples from the various units will suffice.

(c) The carrying out of such a procedure with the aid of local personnel is desirable because they can be left with an adequate knowledge of how to spot check the diet from time to time.

(5) Equipment.

- (a) As planned for field practice the medical officers and nutrition officers would carry all of their own supplies. The use of a hand or electric calculator is desired at the site of the survey. The use of a platform scale (capacity 300 lbs.) is required.
- (b) As planned the only laboratory procedures done in the field would be hemoglobin, total protein and hematocrit. The laboratory men would carry that equipment but would require replenishment of chemicals (mainly CuSO₄) from a central source periodically (once a month). Facilities for boiling syringes and needles would need to be supplied by the organization surveyed.

- (c) The itinerary will be planned in advance and the approximate troop strength at each port of call made known so that arrangements may be made for sending specimen bottles to those sites at the proper time. The specimen bottles should be 6 oz. glass stoppered bottles with a preservative chemical in them. They will be prepared for shipping at the 18th Medical General Laboratory. They will be filled and returned to that laboratory by the field team.
- (d) Needles and syringes and the Van Slyke test kit should be procured in advance by the test team and carried with them. All are standard medical supply items.
- (e) Equipment for performing the vitamin assays at the 18th Medical General Laboratory will be arranged for by the analyst and procured either through the local medical supply or through theater supply.

(6) Information obtained.

- (a) Application of these three methods (dietary surveys, physical examinations and laboratory tests) can be expected to produce the following information:
 - 1. The approximate physical state of nutrition of the troops.
 - 2. The quantity, severity and geographic distribution of specific nutritional deficiency diseases, if any.
 - 3. Quantitative and qualitative data on the amount of food necessary for correction of existing deficiencies and specific sites at which it must be distributed.

b. On the completion of the studies outlined above, a theater policy and organization on nutrition can be established.

2. In addition to the above procedure, it is highly desirable that this group carry out scientific studies regarding nutritional deficiencies as a basis for certain diseases especially lichen planus. It would be necessary for the investigators to go to the Southwest Pacific Area in order to find a sufficient result of these cases as none have been reported in Pacific Ocean Area so far as is known.

THOMAS G. WARD,
Lt Col, Medical Corps,
Chief, Preventive Medicine Branch.

ANNEX 3

HEADQUARTERS UNITED STATES ARMY FORCES
PACIFIC OCEAN AREAS
APO 958

In reply refer to:

15 May 1945.

POYSG 430

SUBJECT: Preliminary Report of Survey of Nutrition

TO : Commanding General, Pacific Ocean Area, APO 958.
Attn: The Surgeon.

1. According to instructions, the undersigned have visited a number of stations in POA for the purpose of selecting suitable and representative areas for a survey of the state of nutrition of the troops and making arrangements for such a study by a nutrition team. In addition, observations were made on dietaries, feeding procedures, food consumption, and the nutritional health of the troops, particularly those in hospitals.

2. The islands visited included Oahu, Hawaii, Saipan, Guam, Angaur, Guadalcanal and New Caledonia. At Angaur, orders were received directing us to proceed to the Southwest Pacific Area for a study of atypical lichen planus. To conserve time and travel, a portion of that study was done before proceeding to Guadalcanal and New Caledonia. After returning to Oahu a second visit was made to Guadalcanal to confer with the nutrition team in operation there, review their findings and discuss further plans and procedures.

3. At each station visits were paid to the Surgeon and his staff, including nutrition officers if any; to most of the general hospitals and stations hospitals at which the staff were interviewed, patients examined and messes observed; to Quartermaster officers and installations such as B & C schools. Interviews were held with the Commanding Generals at Guadalcanal and New Caledonia and with the Commanding Officer at Angaur. On Oahu the 18th General Medical Laboratory was visited and arrangements made for the shipping and receipt of specimens from outlying islands and for other facilities and assistance in laboratory work. The FEA and CAD representatives were visited at Oahu, Saipan, Guam, Guadalcanal and Numea, and the operation of the farm projects at Saipan and Guadalcanal were inspected. It is a pleasure to report that everywhere we received the most hearty cooperation and support and that every facility was afforded us for our study.

ANNEX 4

4. As a result of conferences at Headquarters, POA, the services of a nutrition team were requested from the Office of The Surgeon General for making a survey of nutrition according to the general plan outlined by the preventive medicine consultant (copy attached). At each station visited, arrangements including laboratory space, facilities and any necessary assistance were made for such a survey. The islands selected for the survey included Hawaii, Saipan, Guam, Angaur, Guadalcanal, Espiritu Santo and Kwajalein.

5. The primary object was to select suitable islands and stations and make arrangements for the survey. Any final report on nutrition must await the completion of the survey and an analysis of the findings. However, the following observations were made as mentioned in paragraph 1:

a. The supply of food was in general adequate in amount but frequently was monotonous in kind. This was particularly important in hospitals where a shortage of milk and milk products, meat and fresh vegetables was noteworthy at several stations. Angaur, supplied largely by the Navy, was a notable exception in this respect. Even where supplies of fresh vegetables were available they failed at times to reach the hospital mess.

b. The preparation, cooking and serving of food was frequently of such a nature as to cause an undue loss of nutrients and affect its acceptability.

c. The consumption of food was often less than adequate, usually because of the conditions mentioned in a and b. Again this was much more noticeable among patients and in hospital personnel, particularly in nurses.

d. Many mess officers have no training in nutrition and in the absence of services of a nutrition officer are unable to evaluate nutritional requirements properly and insure the consumption of an adequate dietary. In some instances hospital dietitians were deficient in a knowledge of new and important aspects of nutrition.

e. Because of a lack of knowledge of nutrition and the services of nutrition officers, proper analysis of dietaries and menus often are not made. Statements of nutritional adequacy are sometimes made without data or analysis to support the statement.

f. Reports of mess officers usually are concerned with issue only and no data or information on actual consumption is provided.

g. Forced issues result in improper balance of the diet and poor menus, interfere with the use of certain important items of food and often lead to great waste. Issues of almost 8 lbs. of food per man per day to well troops and 7 lbs. to patients, equalling 4800 to 5800 calories, have been made with accompanying waste. Such intakes may be indicated and advisable under certain circumstances but are significant only when they reflect actual consumption and not issue.

h. Because of the special needs of patients, particularly for protein, the lack of milk in adequate amounts and acceptable form is significant. This could be overcome to a considerable extent by the use of "mechanical cows," few of which were available.

i. The value and importance of the local production of food especially fresh vegetables and fruits was clearly demonstrated. There was, however, some failure to make adequate use of these products and to develop this resource to the greatest advantage, particularly in relation to feeding in hospitals. It was found that FEA is anxious to cooperate in projects of this kind.

6. It is realized that deficiencies described above are recognized in many instances and that efforts are being made to correct them. However, in the absence of personnel specially trained in nutrition, charged with the duty of correcting such errors and maintaining satisfactory dietaries and nutrition, this is difficult. Mess officers, though performing a necessary and important function, cannot furnish the necessary professional service in nutrition. Even in the few places where nutrition officers are available they are not always employed to the fullest extent and best advantage. Sometimes their services are restricted to special groups only.

7. These observations are incomplete and preliminary and it should be emphasized that these visits did not constitute an inspection in the usual sense. Final conclusions and recommendations must await the completion of the study by the nutrition team. Nevertheless the findings are sufficient to justify the following recommendations:

a. That nutrition officers be employed to promote and maintain proper nutrition and dietary as it relates to the health of the troops. In this connection attention is called to AR 40-250 and 40-200.

b. That nutrition officers be stationed at this headquarters, at all bases and at all stations of suitable size. Installations too small to warrant the assignment of a nutrition officer may be served from a neighboring station. The services of nutrition officers should not be confined to hospitals and service troops but should serve Air Force and Ground Force troops as well.

c. That every effort be made to furnish supplements of fresh food, particularly when such can be produced locally and are available. Because of the great value of milk in hospital dietaries provisions should be made for an adequate number of machines for reconstituting milk ("mechanical cows").

Respectfully submitted,

Dr. JOSEPH T. WEARN
Consultant to The Surgeon General

JOHN B. YOUNMANS
Colonel, MC
Director, Nutrition Division

Office of The Surgeon General

ANNEX 4

HEADQUARTERS UNITED STATES ARMY FORCES
MIDDLE PACIFIC
APO 958

In reply refer to:

4 September 1945

SUBJECT: Nutrition Survey in Army Forces, Middle Pacific.

TO : Commanding General, Army Forces, Middle Pacific, APO 958.
THRU : Surgeon, Headquarters Army Forces, Middle Pacific and
Quartermaster, Headquarters, Army Forces, Middle Pacific,
APO 958.

1. Pursuant of War Department orders AG, POA 210.31 dated 31 March 45 and POA orders POPER 210.453, dated 5 May 1945, Major W. B. Bean O-485660 MC, Capt. Chas. R. Henderson O-505072 Sn C, Capt. Lyle M. Richardson Jr. O-409276 QMC and Dr. Robert Johnson, Civilian Consultant, made a nutrition survey of troops on Hawaii, Guadalcanal, Saipan, Iwo Jima, and Guam, which included Okinawa casualties. A summary of the results of this survey conducted 17 April to 12 June 45 follows:

a. In each place ration issue was studied by interviews with Quartermaster personnel and examination of warehousing and subsistence. Information on over-all food consumption was obtained by examination of messes.

b. In each place approximately fifty men selected so as to be representative of total troop strength were given intensive individual examinations. Observations included:

- (1) Thoroughgoing interviews on dietary history overseas, in order to estimate food consumption.
- (2) Medical history to determine symptoms attributable to nutritional disturbances.
- (3) Medical examination to establish the absence or presence of clinical signs of specific nutritional deficiencies.

ANNEX 5

- (4) A physical fitness test to estimate the physical stamina of the men in comparison with that of trained infantry troops in the U.S.A.
- (5) Biochemical measurement of whole blood hemoglobin, plasma protein, and urinary vitamin C, vitamin B₁, vitamin B₂, chloride and acetone bodies. These measurements gave an assessment of nutritional status with respect to water, calories, salt, hematopoietic factors, protein, and vitamins C, B₁, and B₂.

c. Interpretation of results was made by comparison of data in POA with data obtained previously by identical methods in well fed trained infantry troops in the U.S.A. Primary emphasis was placed upon the over-all status of the bulk of troops in large units. It was recognized that even though the average status of groups might be satisfactory, the detection of even a small number of men with nutritional disturbances would indicate a problem possibly serious from the standpoint of the individual or his mess, but not necessarily important from the standpoint of the efficiency of a whole garrison.

d. The results for the groups studied may be summarized as follows:

(1) Quartermaster Aspects:

- (a) Condition of warehoused subsistence was in general excellent.

Exceptions were:

1. Canned grapefruit juice, old C ration "M" units, and compressed yeast on Guadalcanal.

2. Canned corned beef on Guam.

- (b) There was satisfactory movement of most items. Outstanding overages occurred in some items. Those included:

1. Dehydrated soups.

2. Dehydrated carrots, beets, and apple nuggets.

3. Argentine corned beef.

ANNEX 5

4. Biscuits for use with B ration.

5. Old "C" rations.

- (c) There is a reasonably satisfactory supplement of frozen meats, butter, cold storage vegetables, and fresh eggs. Nevertheless, the amount of reefer space available could be increased with benefit to the troops.
- (d) Wherever farms have been established, they have provided valuable fresh supplements to the "B" ration.
- (e) One of the most important considerations in Army rations is acceptability. Outstanding findings in the areas studied in POA were:
 - 1. Certain meat items in "B" rations were unacceptable. These included corned beef, corned beef hash and meat and vegetable stew.
 - 2. Dehydrated foods in general were disliked. Only where cooks were unusually skillful did these products become reasonably acceptable.
 - 3. Dried eggs were not acceptable except when used in baked products. Again preparation technique plays a large role.
 - 4. Type I and type II biscuits were unacceptable. Bread was well liked and was being issued in adequate amounts.
 - 5. Acceptability of the special rations was in the following descending order: new "C" ration; 10 in 1; "K" ration; old "C" ration; "D" ration. New "C" ration appeared to be in general highly acceptable except for a few items such as biscuits and the ham, eggs and potatoes.

ANNEX 5

6. Beverages, especially the lemon drink, were acceptable whenever there was sufficient ice available and enough sugar in the beverage. An unfortified product was used on Guadalcanal. Among front line troops without ice, consumption was adequate.

(2) Nutrient Intake:

- (a) In general, the nutrient intake was not much different among troops in POA and in the U.S.A. Intake of the following nutrients was on the average for all of POA at least as high as recommended by the National Research Council; calories, protein, iron, vitamin A, thiamine, niacin and ascorbic acid. Average intake of the following nutrients in individual places varied somewhat from National Research Council Standards; calcium everywhere was low by 12%; thiamine was low by 6% on Guadalcanal; riboflavin ranged from 14% low on Iwo Jima to the recommended intake on Guam.
- (b) At the time of the survey the intake of vitamin C on Guadalcanal was very low owing to temporary shortages of fresh vegetables, fresh fruit and canned fruit; and to failure to use fortified beverages.
- (c) In each place a number of subjects was found whose food intake was in one or more respects unsatisfactory owing to unacceptability of certain items, to personal dietary habits or to inefficiency on the part of their messes.

(3) Medical History:

- (a) No men interviewed complained of groups of symptoms classically associated with specific nutritional deficiencies. Nevertheless, certain symptoms were relatively common, although their origins might have been in hard work, unfavorable environment, isolation from home, danger or many other factors including nutritional. The commonest symptoms, and these were found in about 10% of the men, were: Occasional gastrointestinal upsets;

ANNEX 5

easy fatigue; various expressions of nervousness and emotional disturbances; mild neuro-circulatory complaints; and intolerance to heat. Chronic skin diseases, especially miliaria and epidermophytosis were complained of by over half the men.

(4) Physical Examination:

- (a) No cases were detected of classical specific nutritional deficiency diseases, such as scurvy, beri-beri, ariboflavinosis and pellagra.
- (b) A significant percentage of men in each place showed one or more physical findings which by some, but by no means by all, medical nutritionists have been considered to be associated with specific nutritional disturbances. So far as the evidence of this survey extends, most of the men found to have one or more of such lesions had adequate body stores of vitamins. A possible exception was on Guadalcanal where ascorbic acid intake was low, as was urinary excretion of ascorbic acid. There was a significant amount of acute inflammation of gingival margins and swelling of interdental papillae on Guadalcanal, in contrast to Guam where there was very little, and where intake and urinary excretion of vitamin C were the highest seen in POA.
- (c) The ratio of body weight to height may be used as a measure of calorie intake since a pronounced loss in weight results in an abnormally low value for the ratio in comparison with the value for garrison troops in U.S.A. In POA on the average this ratio was normal, and indicated that calorie intake had been adequate for some time. The Iwo Jima garrison averaged 5 pounds per man lighter for height than the Colorado infantrymen. All other garrisons and the Okinawa Casualties averaged as heavy or heavier for height than the Colorado troops. No subject studied was seriously underweight. Several were too heavy for maximum physical efficiency.

(5) Physical Fitness:

(a) On the average, physical stamina was as good in POA as among infantry troops in the U.S.A. As is true in any population, active groups, such as port battalions scored better than less active groups such as medical corpsmen. In each place there were men who scored "poor" in the fitness test condition, but in this survey it was not possible to correlate examples of poor physical fitness in any definite way with specific nutritional disturbances. The percentage rating "poor" on Hawaii was 44, on Guadalcanal 32, on Guam 12, on Iwo Jima 2. The over-all average for POA was 14% as compared with 9% in the Colorado infantrymen.

(6) Biochemical Results:

(a) As judged by measurements on blood and urine, the biochemical status with respect to the following nutrients was on the average satisfactory; water, salt, calories, iron, protein, ascorbic acid, thiamine and riboflavin.

(b) In each place a certain proportion of subjects was definitely low with respect to certain vitamins. The most important findings along these lines were:

1. On Guadalcanal where 45% of the men were "deficient" in ascorbic acid. Other islands had the same or fewer than Colorado infantrymen.
2. A few examples of "deficient" riboflavin excretion: 8% of subjects on Guam; 9% of the subjects on Iwo Jima; and 6% among the casualties from Okinawa.
3. Single cases of "deficient" thiamine excretion on Guadalcanal, Guam and Iwo Jima, but none elsewhere. The average excretions of thiamine everywhere except

on Guam were lower than in Colorado infantrymen but by no means within the "deficient range."

(7) Psychological Studies:

(a) No psychological studies were made. The importance of the quality of food served can hardly be overestimated in the maintenance of good troop morale. There is much to be desired in the preparation of available food in many messes.

2. Conclusions:

a. Continued supervision of troop nutrition as prescribed in AR 40-250 and W.D.A.G. Letter 430.2 MO-D-M dated 12 January 1942, and corrective action where defects are found indicated.

b. A detailed description of procedure and results will be found in the attached appendix.

3. Recommendation:

a. To implement the above conclusion, it is recommended that nutrition officers SnC MOS 3316 be assigned to duty in this theater as follows:

1 for Hq AFMIDPAC

2 for CPBC Hq.

4 for Saipan and Tinian Areas as follows:

1 for Base Command Hq.

1 for work with hospitals.

1 for work with Service Force Troops.

1 for work with AAF Troops.

1 for each Base Command under jurisdiction of this theater.

1 for each Army and such others as may be required in accordance with the policy described in paragraph 1c AR 40-200.

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b. That the Surgeon, AFMIDPAC and the Quartermaster AFMIDPAC jointly develop and supervise the food service (catering) program to the fullest possible extent. Reference is made to W. D. Cir. 149, dated 21 May 1945 as a guide.

/s/ William B. Bean
WILLIAM B. BEAN
Major, MC

/s/ Charles R. Henderson
CHARLES R. HENDERSON
Captain, SnC

/s/ Robert E. Johnson
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LYLE M. RICHARDSON
Captain, QMC

/s/ Wm F. Ashe, Jr.
WILLIAM F. ASHE, Jr.
Major, MC

ANNEX 5

APPENDIX
TO
REPORT OF
NUTRITION SURVEY IN POA*
APRIL--JUNE 1945

From

THE NUTRITION DIVISION OF THE OFFICE OF THE SURGEON GENERAL

by

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* Authority: Letter Orders, War Department, dated 1 April 1945.

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ANNEX 5

I. Introduction

A survey has been conducted on small representative samples of troops in various parts of the Pacific Ocean Area to determine their current nutritional status. The scope of the survey also included the current ration plan and practice in every echelon of command.

A team of four trained and experienced observers was sent out by the Nutrition Division of the Office of The Surgeon General to conduct this survey. The plan included: Observation of feeding policy and practice, conducted by the nutrition officer and the quartermaster officer; detailed dietary history on individual soldiers by the same officers; detailed medical history and physical examination for nutritional disorders by the medical officer; a biochemical assessment of nutritional status by the biochemist; and a physical fitness test. Where indicated additional pertinent information was obtained by examination of hospitalized patients and by interviews with local personnel other than those subjected to the full battery of tests. The places and times in the Pacific Ocean Area where surveys were conducted were:

Hawaii Garrison.....	17 April--23 April 1945
Guadalcanal Garrison.....	8 - 15 May 1945
Guam Garrison and casualties from Okinawa.	2 May--4 June 1945
Saipan Casualties from Okinawa.....	4 June--9 June 1945
Iwo Jima Garrison.....	9 June--12 June 1945

II. Methods, Procedures & Subjects

This section presents the complete schedule followed. Variations in procedure necessitated by local conditions are discussed in the reports of individual islands.

The survey utilized sampling techniques to study intensively a small group representative of the troops under consideration. Care was taken to obtain subjects from many different organizations and in proportion to the number of men in the several organizations. Since the time for study was limited to a few days at each base, the equipment limited by weight allowance, and all observations and determinations made by a team of only four observers, it was not possible to study a very large proportion of the troops. However, proper sampling methods yielded results of high significance; and this was particularly true where the findings followed a consistent pattern, whether good or bad. Various assignments and duties were assumed by the four observers in the following manner:

<u>Assignment</u>	<u>Responsible Person</u>
Subsistence Policy.....	Quartermaster Officer
Ration Practices.....	Quartermaster Officer
Mess Survey.....	Nutrition Officer
Dietary History.....	Nutrition & Quartermaster Officers.
Medical History.....	Medical Officer
Physical Examination.....	Medical Officer
Physical Fitness Test.....	All
Biochemical Tests.....	Biochemist
Additional Relevant Data.....	All

A. Rations

The overall subsistence policies and problems for each location were discussed with Quartermaster Corps officers of the Pacific Ocean Area and of each area. Inspections were made of subsistence items for the purpose of determining particularly the keeping quality, age, and stocks of certain items. Observations on food preparation methods were made in certain organization messes. Mess personnel and other enlisted personnel were interviewed concerning the preference for different ration items.

B. Mess Survey and Dietary History.

1. Intensive mess surveys were made in two representative messes for the following purposes:

- a. To determine the average intake by the troops of certain important nutrients.
- b. To estimate which foods were best consumed by the troops and which ones, if any, were wasted in substantial amounts.

2. These surveys were conducted in each mess for a period of from three to seven days during which time the following data were obtained:

- a. Inventories of subsistence items on hand at the beginning and at the end of the survey;
- b. Issues of subsistence to the mess during the survey;
- c. Waste of all foods including plate waste, items discarded without preparation, and items prepared but not served;

- d. Head count on men eating at each meal;
- e. Estimations of losses in cooking of thiamine, riboflavin, niacin, and ascorbic acid.

3. From these data the consumption by the mess of each food item was calculated and expressed in the "as issued" form. Tables of food composition were used to calculate from the quantities of various items consumed the intake of the following nutrients, taking into account probable losses in cooking: calories, protein, calcium, iron, vitamin A, thiamine, riboflavin, niacin, and ascorbic acid.

4. Further information was obtained concerning all test subjects selected for intensive study, by a careful dietary interview. From each subject the following information was obtained:

- a. A chronological record of approximately the ration or combination of rations eaten since he came overseas;
- b. Types of food eaten in considerably above average amounts;
- c. Types of food eaten not at all or in small amounts; and
- d. Types of food, if any, eaten in addition to that served in his mess, or issued in the field.

C. Medical History and Physical Examination.

The clinical nutritional status was determined by obtaining a medical history stressing chiefly those diseases and conditions which might predispose to or precipitate a nutritional disorder, and those symptoms and signs which are suggestive or characteristic of general or specific forms of malnutrition. The forms used are found in the appendix.

The physical examination followed almost the exact form used at Camp Carson in 1944. It was confined to examination of the eyes (without slit lamp), the mouth, tongue, teeth, the skin and the neuromuscular system. The basis for diagnosis is appended below.

Criteria, standards, and definitions of physical findings for use in examination for nutritional status:

1. Vitamin A.

a. Eyes.

- (1) Lack of tearing; dryness of conjunctives and sclerae (of a grade deemed significant by the examiner). Conjunctivitis, characterized by the usual signs of inflammation redness, injection and swelling (and graded slight, moderate, or severe). Slight will be redness and injection of conjunctivae with little or no swelling or photophobia and minimal involvement of the bulbar conjunctivae (sclerae); moderate, of greater extent with some photophobia; severe, swelling and blepharospasm. Degree of lachrymation will be significant in relation to conjunctivitis as will photophobia. Purulent conjunctivitis to be noted.
- (2) Local (or general) thickening of sclera characterized by loss of translucency, loss of sheen, elevation and pigmentation (and graded slight, moderate, or severe). Slight to be interpreted as one localized area in either eye, or diffuse thickening of significant grade according to judgment of examiner; moderate, 2 to 4 localized areas without significant elevation or pigmentation, or moderate diffuse thickening; severe, characteristic Bitot's spots, and/or gross diffuse thickening, folds. Note ptergia and pingueculae.
- (3) Cloudiness or steaminess of cornea, localized or general, otherwise unexplained. To be recorded merely as involvement of cornea.

b. Skin

- (1) Follicular hyperkeratosis consisting of at least several grouped papules, present in at least one of the sites of predilection (the lateral surfaces of arms, thighs, and lower abdomen) as well as in any other location, without any consistent folliculitis (infection). Other features to be considered in forming clinical judgment are dryness of the skin, degree of sweating relative to environment, and broken hairs. To be graded slight,

if papules small and confined to approximately one-third of thighs, arms or abdomen; moderate, if papules larger, even though confined to any two of above sites; severe, if papules large (25 mm.) and involve above and additional areas.

(2) An acneform eruption consisting of numerous (more than 3-4) red papules simulating acne but with little actual infection (pus), distributed over trunk and arms with little or no involvement of face. To be graded slight if not more than 6, or if confined to back, chest, or arms; moderate, if 10-20, or involving two or more of above areas; severe, if in greater number in all areas.

2. Vitamin B₁ (Thiamine)

- a. Muscular weakness, lower extremities. To be determined during physical fitness tests.
- b. Muscle tenderness (bilateral). To be determined by pinching belly of gastrocnemius with force adjudged by examiners not to cause pain in normal subjects and to be graded slight, moderate, or severe according to judgment of examiner.
- c. Nerve tenderness (bilateral). To be determined by pressure over peroneal nerve at head of fibula with force adjudged by examiner not to cause pain in normal subject. Distinction to be made from paresthesia. To be graded slight, moderate, or severe according to judgment of examiner.
- d. Loss of vibratory sense (bilateral). To be tested over malleolus with tuning fork (256). To be recorded present or absent.
- e. Loss of reflexes (bilateral). Ankle and knee (patellar) reflexes to be tested sitting, without reinforcement. To be recorded present or absent for each site.
- f. Muscle atrophy (bilateral). Atrophy of muscles of lower extremity (thigh and leg) otherwise unexplained. Presence of atrophy, and absence of other cause, to be determined by judgment of examiner.

g. Edema. Pitting edema of sacrum and legs (shine) and feet as determined by palpable depressions from pressure of fingers of degree to be judged by examiner. Recorded present or absent.

3. Riboflavin

a. Skin - A dermatitis of the face (clar folds, malar area and forehead) and ears clinically characteristic of the dermatitis of riboflavin deficiency, with or without large, dry comedones. To be recorded present or absent.

b. Mouth.

(1) Radiating fissues (not scars) at the corners of the mouth, in the absence of false teeth (plates). To be recorded present or absent.

(2) Redness and grayish desquamation of the vermillion border of lips, with or without ulceration and crusting, not localized as with trauma, herpes, etc. To be recorded present or absent.

4. Niacin

a. Skin - Symmetrical, bilateral, dermatitis of exposed areas as hands, feet, neck or face (or of scrotal or anal areas), with active or subsiding inflammation or chronic inflammatory changes characterized by induration or atrophy, roughing, and desquamation and pigmentation. Recorded present or absent, chronic or acute, and slight, moderate, or severe by extent and activity.

b. Mouth

(1) Glossitis - A redness and inflammation of tongue with atrophy of papillae involving at least tip, and if sides also tip of tongue; to be graded slight, if including no more than tip and edges to 0.5 cm. without complete atrophy; moderate, if greater in extent or degree or with complete atrophy; and severe, if includes ulceration, infection, edema, etc.

(2) *Stomatitis* - Inflammation similar to the glossitis but only if accompanied by glossitis. To be recorded present or absent.

5. **Vitamin C (Ascorbic Acid)**

a. Skin

(1) Petechial or purpuric eruption otherwise unexplained (in judgment of examiner). To be graded slight, if limited to small areas as about ankles, waist, etc; moderate, if more extensive; and severe, if extensive and large, or associated with similar lesions in mucous membrane or spontaneous bleeding (except from gums).

b. Mouth

(1) *Gingivitis*, characterized by and recorded as either:

(a) Acute redness and inflammation of dental margin, with or without swelling of interdental papillae, with or without bleeding, spontaneous or on slight trauma.

(b) Chronic thickening, lividity, and retraction of gums.

(c) A combination of both.

(2) Also to be recorded, the presence or absence of deposits of tartar, cervical fillings, dental work, debris and infection in such relation to the above changes as to possible account for their occurrence. The latter to be recorded as present or absent without particular designation.

c. Muscle tenderness (See Thiamine).

d. Edema (See Thiamine).

6. Protein

a. Edema (See Thiamine).

D. Physical Fitness Test

Physical fitness in the test subjects was estimated by use of the Harvard Fatigue Laboratory 20-inch step test. This consists of stepping up on a 20-inch bench or platform, every 2 seconds for 5 minutes or as long as possible short of that period. The subject then sits down, and his pulse is counted from 1 minute to 1 1/2 minutes after cessation of exercise. Scores are computed from a table (1), and subjects are rated poor, average, or good.

E. Biochemistry.

1. Specimens of urine and blood were obtained before breakfast, according to the following schedule:

0540	Reveille
0550	Subjects report without eating, or emptying bladder.
0600	Subjects empty bladder into latrine and drink approximately 1/2 pint water to insure diuresis.
0600 to 0730	Specimens of venous blood drawn directly into heperia in vials.
0730	Subjects empty bladders completely into paper cups. Time and volume of urine noted. Aliquots of 25 ml. stored in amber glass bottles with oxalic acid added to stabilize vitamins.

2. The following estimations were made by the methods indicated below:

- a. Hemoglobin and plasma protein by the copper sulfate-specific gravity method of Phillips, Van Slyke and colleagues (2).
- b. Urinary chloride by the qualitative reaction of Volhard (2).
- c. Urinary acetone bodies by the qualitative nitro-prusside reaction of Rother (2). Nitroprusside positive substances, not acetone bodies, which appear in urine as a result of eating some kinds of baked products were searched for at the same time.

- d. Urinary thiamine and riboflavin quantitatively by the field fluorometric procedures of Johnson, Sargent, Robinson and Consolazio (2).
- e. Urinary ascorbic acid by titration against 2, 6-dichlorophenol indophenol according to the method of Farmer and Abt (2).

3. Interpretation of the biochemical data was made by comparison of average blood levels and urine excretions with averages obtained in infantrymen in Colorado who had subsisted for 8 weeks on a very good ration and by reference to Table 1 which follows, listing normal ranges as determined by the present methods, and levels suggestive of deficiency serious enough to impair morale and physical fitness and so affect general health deleteriously with or without clinical deficiency diseases if maintained long enough. The lower levels for normality were found in men whose physical fitness, morale and general health were satisfactory as judged by their line and medical officers. The data were obtained during repeated examinations of approximately 50 men in New England, 80 men in Saskatchewan in winter, 695 men in the Colorado Rockies in summer, and from single examinations of 149 men in the U. S. Desert Training Center in summer. Biochemical data were not used from men who had recently taken significant numbers of vitamin tablets.

TABLE 1
Normal Ranges and Levels Suggestive of Deficiency

	Normal Range	Deficient Level
Whole Blood Hemoglobin (Gm per 100 ml)	15 to 19	below 12
Plasma Protein (Gm per 100 ml)	6.1 to 7.3	below 5.5
Urinary Chloride (Qualitative, 0 to 4)	1 to 4	below 1
Fasting Urinary Vitamin C (Mg per hr)	0.3 to 1.0	below 0.3
Fasting Urinary Vitamin B ₁ (Mcg per hr)	2 to 25	below 2
Fasting Urinary Vitamin B ₂ (Mcg per hr)	10 to 100	below 10
Acetone Bodies (Qualitative, 0 to 4)	0	above 0

F. Additional Data

Examination of hospital patients, discussion with medical officers, line officers and enlisted men, and miscellaneous observations on various local diseases and problems were carried out at every opportunity.

References

1. Armored Medical Research Laboratory, report on Project 30, test of Acceptability and Adequacy of U. S. Army, C, K, 10-in-1 and Canadian Army Mess Tin Rations, 22 November 1944.
2. Laboratory Manual of Field Methods for Biochemical Assessment of Metabolic and Nutritional Condition, Harvard Fatigue Laboratory, March 1945.

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III HAWAII, 17-22 APRIL 1945.

A. Issue of Rations

The Island of Hawaii issues rations on the basis of the Hawaiian Department menu, Field Ration, United States Armed Forces, Central Pacific Area, effective 1 February 1944. Some use of island grown fresh produce in season is made, particularly of celery, tomatoes, cucumbers and lettuce. No use is made of pineapple and other native fruits on the Island of Hawaii. The bulk of the rations is received from mainland Ports of Embarkation via Oahu where the Quartermaster, Headquarters, Central Pacific Base Command, breaks down and distributes food for the several islands of the Central Pacific Base Command in accordance with inventory adjustments from each island. Limitations on precise adjustments of inventories are caused by (1) substitutions at the Port of Embarkation in the filling of Central Pacific Base Command requisitions, (2) substitutions at Central Pacific Base Command in filling inventory adjustments from Hawaii, (3) forced issues of items to Central Pacific Base Command, (4) fluctuations in the availability of refrigeration both at the islands and on the reefer ships supplying the troops, (5) variation of several hundred percent in troop strength drawing rations at Hawaii from time to time in accordance with the departures and arrivals of combat organizations, including Marines.

All subsistence on Hawaii is stored in warehouses, providing ample protection from rain and direct sunlight.

The Island Quartermaster with three years of overseas experience in the handling of subsistence, felt that the V Board, the new double-seamed milk can and the multiwall flour sack were among the most marked improvements in the packaging of subsistence. He was of the opinion that dehydrated products, with the exception of julienne style potatoes were poorly accepted. He stores rations for an estimated average troop strength of 5000; at the present time he has 30,000 cans of dehydrated carrots, 4980 cans of dehydrated beets and 70,800 lbs. of apple nuggets on hand. The only other food items which were on hand in overbalanced amounts were 15,000 twenty-five pound cans of biscuits for the B ration (probably Type II), 74,000 pounds of Type I biscuits for use in the B ration, and 100 days supply of Argentine corned beef for 25,000 men.

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The Island Quartermaster supplies components for bread making to the bakery on the basis of 50/lbs. bread/100 men/day, although more ingredients are available and are supplied upon request. White bread is usually made, but occasionally an issue of raisins is sent to the bakery for making raisin bread. Compressed yeast frequently arrives in poor or unusable condition probably owing to great temperature fluctuations in transit and storage. The quartermaster much preferred the dried yeast when available. Unit messes are provided with yeast for baking only upon request, and the statement was made that very little baking is done in the unit messes.

Coffee for Hawaii is locally grown Kona coffee, roasted and ground on this island.

Dairy products are limited to ice cream, evaporated milk, butter, and eggs, all shipped in from the mainland. Ice cream is issued occasionally and eggs are provided at frequent intervals.

Meat is supplied as frozen, boneless beef, frozen lamb carcass, frozen chicken, and semi-boned frozen pork loins. Some use is made of locally available fresh beef and lamb.

B. Dietary Intake.

On the basis of mess surveys and interviews with the 50 men selected for intensive study it was estimated that the average nutrient intake of the soldiers on this island is approximately that shown in Table 1.

TABLE 1

Average Nutrient Intake of Troops on Hawaii Compared with N.R.C.
Recommended Daily Allowances

	Hawaii	NRC	Colorado Infantry- men
Calories	3400	---	3900
Protein, gm.	110	70	125
Calcium, gm.	0.7	0.8	0.9
Vitamin A, I, U.	10000	5000	8000
Iron, mgm.	22	12	25
Thiamine, mgm.	1.9	1.7	2.1
Riboflavin, mgm.	2.1	2.2	2.5
Niacin, mgm.	25	17	28
Ascorbic acid, mgm.	75	75	110

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In general, the average nutrient intake is not much different on Hawaii than the intake of similar troops in the United States except that riboflavin and calcium are a little lower in Hawaii because of the absence of fresh milk. When the average intake is compared with N.R.C. standards it will be noted that protein, vitamin A, iron, thiamine, niacin, and ascorbic acid were adequate, riboflavin 0.1 mgm. too low, and calcium 0.1 gm. too low.

Individual soldiers vary greatly in their intake because of differences in size, activity, dietary habits and the efficiency of their different messes. The following facts disclosed in the dietary interviews with 50 men, might be considered to be of some nutritional significance:

1. Seven men (14%) consumed fair amounts (1/2 pint or more per day) of fluid milk in addition to the evaporated and dried milk supplied in their mess.

2. Eight men (16%) consumed little if any vegetables other than potatoes.

3. Six men (12%) consumed little fruit except for that in pies and cobblers.

4. Neither evaporated nor dried milk was used as a beverage by anyone, although one or the other was used on cereal by about 30%.

C. Medical History.

As would be expected in garrison troops, the medical History was almost free from disease and injury. There were no chronic disorders which might have contributed to nutritional deficiency. Repeated hospitalizations had been infrequent. There were a few complaints of nervous indigestion, mild neurocirculatory symptoms and disturbances of emotion. The incidence of significant symptoms is shown in the following table:

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TABLE 2

Percentage of Troops with Significant Medical History.

<u>Item in History</u>	<u>% of Subjects</u>
A. Pre-Army	
Pulmonary Disease	0
Skin Disease	0
Allergic Disease	2
Cardiovascular Disease	0
B. Gastrointestinal Complaints	
Change in Appetite	0
Change in Bowel Habits	0
Significant Weight Loss	0
C. Cardiorespiratory Complaints	
Chronic Cough	4
Precordial Pain	2
Dyspnea	0
Palpitation	0
Intolerance to Effort	10
D. Diseases	
Malaria	0
Dengue	0
Dysentery	2
Fevers of Unknown Origin	0
Prickly Heat	4
Lichen Planus	0
Athlete's Foot	34
E. Neuropsychiatric Complaints	
Joints	0
Muscles	0
Eyes	0
Headache	14
F. Miscellaneous	
Wounds	0
Regular Atabrine Intake	2
Regular Supplementary Vitamins	12 (only one subject recently)
Exposure to Toxic Agents	2

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D. Physical Examination and Fitness Test.

Table 3 lists significant findings in the physical examination of troops in Hawaii from the nutritional point of view. There were no severe lesions of the eyes, gums or oral mucous membranes. One subject had a peculiar shark skin hyperkeratosis; and one subject had no elicitable knee jerks, but his ankle jerks were present. These findings did not appear to have a nutritional cause. There was less conjunctivitis than in any similar group seen to date. The humid climate and large proportion of cloudy days probably explain it.

TABLE 3

Percentage of Troops with Significant Physical Findings.

	Hawaii	Colo Inf
A. Eyes		
Conjunctivitis, slight	24	46
Conjunctivitis, moderate	4	10
Pterygia	2	10
Pingueculae	36	8
Muddy sclerae	18 (all negroes)	--
B. Mouth		
Inflammation of gums	8	16
Swelling of interdental papillae	4	--
Easy bleeding of gums	8	--
Oral hygiene good	50	44
Oral hygiene fair	46	46
Oral hygiene poor	4	10
Cavities in teeth	28	--
Pigmentation of oral mucosa	12 (all negroes)	--
Cheilosis	0	6
C. Skin		
Follicular hyperkeratosis	4	27
Acne	4	21
Seborrhea	10	--
Spooning of Nails	2	--
Epidermophytosis	16	--
Excessive palmar sweating	10	--
D. Neuromuscular		
Absent knee jerks	2	0.3
Absent ankle jerks	0	0.2
Absent vibratory sense	0	0
Flat foot	2	--

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It is concluded that the troops of Hawaii are in an excellent state of health as judged by low incidence of signs commonly attributed to general malnutrition or to specific deficiency diseases.

In the test of physical fitness about half of the subjects made poor scores, and only 12% good scores. Motivation to perform well was in general good, but many of the troops were in clerical or other sedentary jobs, took but little regular exercise, and appeared flabby and overweight. This is a common finding where regular vigorous exercise and training are not practised. The higher the score in the test, the better the condition of the subject. The overall average for all troops was 55; for the white troops, 49; and for the negroes, most of whom were part laborers, 70. Another factor contributing to low scores was the high average age in comparison with men previously studied. Previous work has shown that scores drop steeply after the age of about 25. The distribution of scores was:

TABLE 4
Distribution of Scores in Physical Fitness Test

Score	Percentage of Subjects		Rating
	Hawaii	Colorado Infantrymen	
20 and 25	6	0	poor
30 and 35	18	2	
40 and 45	20	7	
50 and 55	14	8	average
60 and 65	14	12	
70 and 75	16	47	
80 and 85	4	18	good
90 and 95	8	5	
100 and 105	0	1	
Means	55	71	

ANNEX 5

E. Biochemical Results.

The arithmetic means and ranges for hemoglobin, plasma protein, fasting urine chloride, ascorbic acid, thiamine and riboflavin are presented in Table 5. These values are tabulated in a manner facilitating comparison with values obtained by the same methods on infantrymen in Colorado whose intakes are shown in Table 1. Table 6 presents the values in frequency distributions.

It will be noted from Table 5 that hemoglobin, plasma protein and urinary chloride values in the Hawaii group were almost identical with the Colorado data. Ascorbic acid values were 0.3 mgm. lower. Thiamine excretion was 3 mg. lower in Hawaii, and riboflavin was identical.

Nitroprusside and acetone body determinations in all urines were negative. When all biochemical data for each individual were inspected, it was concluded that no subject was deficient nutritionally with respect to carbohydrate, water, protein, salt, hematopoietic factors, thiamine or riboflavin. One subject was "deficient" in ascorbic acid. (Table 7).

It is of interest that riboflavin excretion was higher in white men (80% of subjects) than in Negro troops (20% of subjects) and higher in troops on the garrison ration than on the field ration. Two possible explanations of the racial differences are (1) the Negro troops returned from 11 months in the Marshalls 4 months ago, where food supplies may have been different than in Hawaii, (2) the Negro troops buy less fresh milk in town than do white troops. The men on garrison ration apparently also drink somewhat more milk than men subsisting on the field ration.

TABLE 5

Biochemical Values for Troops of Hawaii Compared with Values Obtained on Infantrymen in Colorado

	50 Men In Hawaii	Colorado Infantrymen
	MEAN	MEAN
Whole blood hemoglobin (gms/100 ml.)	16.6	17.1
Plasma Protein (gms/100 ml.)	6.8	6.5
Urinary chloride (reading fr 0 to 4)	2+	2+
Fasting Urinary Ascorbic Acid (mgm/hr)	0.5	0.8
Fasting Urinary Thiamine (mcg/hr)	9	12
Fasting Urinary Riboflavin (mcg/hr)	26	26

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TABLE 6

Frequency Distributions of Biochemical Values of Troops on Hawaii.

Hemoglobin		Plasma Protein		Fasting Thiamine	
Gm/100 ml.	% of Troops	Gm/100 ml.	% of Troops	Mcg/hr	% of Troops
13.0-13.9	2	5.5-5.9	2	0-4	9
14.0-14.9	6	6.0-6.4	8	5-9	65
15.0-15.9	30	6.5-6.9	48	10-14	24
16.0-16.9	24	7.0-7.4	38	15-19	2
17.0-17.9	22	7.5-7.9	4		
18.0-18.9	12				
19.0-19.9	4				

Fasting Ascorbic Acid		Fasting Riboflavin		Qualitative Urine	
Mgm/hr	% of Troops	Mcg/hr	% of Troops	Reading	% of Troops
.2	2	10-19	23	1	8
.3	9	20-29	52	2	57
.4	33	30-39	17	3	31
.5	21	40-49	6	4	4
.6	21	70-79	2		
.7	6				
.8	2				
.9	2				
1.2	2				
1.4	2				

TABLE 7

Differences in Biochemical Between Garrison and Field Ration Troops and Between White and Negro Groups.

	Ascorbic Acid	Thiamine	Riboflavin
	Mgm/hr	Mcg/hr	Mcg/hr
Garrison ration, White	0.4	10	35
Field ration, White	0.5	8	25
Field ration, Negro	0.5	8	20

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TABLE 8

Time Spent in the Pacific

Months	% of Subjects
0-5	2
6-11	8
12-17	22
18-23	18
24-29	14
30-35	30
36-40	6

TABLE 9

Age of Subjects

Age	% of Subjects
19	4
20	2
21	8
22	8
23	4
24	10
25-29	34
30-39	28
40 and up	2

MEAN - Hawaii 29 years

MEAN - Colorado Infantrymen 24 years

TABLE 10

Distribution of Enlisted Grades

Grades	% of Subjects
4	12
5	22
6	60
7	6

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TABLE 11

Distribution of Heights and Weights

Height inches	110- 119	120- 129	130- 139	140- 149	150- 159	160- 169	170- 179	180- 189	190- 199	200- 209	Sum
63-63 3/4			1								1
64-64 3/4	1	1			1						3
65-65 3/4			1								1
66-66 3/4		1	1	2	3	1	1				9
67-67 3/4		1			2	3		1			7
68-68 3/4			1	1	1	1	3				7
69-69 3/4				2	2	2	1				8
70-70 3/4					1	3	1	2			7
71-71 3/4				1		1		2			4
72-72 3/4				1	1			1			3
Sum	1	3	4	7	11	11	6	6	0	1	50

Hawaii

MEAN Height 68.9 inches
MEAN Weight 158 pounds

Colorado Infantrymen

68.8 inches
153 pounds

F. Additional Observations.

An opportunity was taken to observe patients on the wards of the 26th Station Hospital. Tropical disease is not a problem in personnel on this island at this time. Prisoners of war frequently show a variety of intestinal parasites (hookworm cannot be eradicated from chronic cases by the therapeutic agents available), filariasis and other diseases. Upper respiratory infections are common with some arthritis and rheumatic fever.

The current ward population is composed of patients with common medical diseases, fungus infections of the hands and feet which respond slowly to treatment, and many cases of psychosomatic disturbances which run the gamut from clear-cut hysteria and psychosis to the vaguely determined hinterland of neuro-circulatory, gastrointestinal and peripheral vascular disorders, which tax the diagnostic acumen of the staff. Medicine of high calibre is practiced.

The problem uppermost in everyone's mind is the rotation policy or lack of it; and past experience has led to a widespread sense of frustration. "Tropical deterioration" has not set in but an outside observer detects a sense of fatigue and slowness, which are not apparent to those it affects. Exercise, entertainment, recreation, mail, and meals appear to be handled well.

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The climate is rainy and cool. Blankets are needed at night, though it is warm during the day and hot when the sun shines.

G. Summary and Conclusions.

1. A survey of 50 representative soldiers on the Island of Hawaii, 17 to 22 April 1945, was conducted at the 26th Station Hospital.

2. Observations included interviews on overseas dietary history, medical history and examination, a fitness test and biochemical assessment of the nutritional status of the soldiers. The island quartermaster was interviewed, warehousing and subsistence examined and a mess studied. Some patients in the hospital were observed.

3. The average consumption of all nutrients except riboflavin and calcium met N.R.C. Standards. Riboflavin was 0.1 mgm. and calcium 0.1 gm. low.

4. The nutritional status of the soldiers was good as indicated by the absence of clinical evidence of deficiency disease or malnutrition; and by satisfactory biochemical status.

5. The condition of the warehoused subsistence was excellent. Present stocks on hand indicate a large surplus of dehydrated carrots, beets, apple nuggets; of Argentine corned beef and biscuits for use with B ration. No use is made of locally produced pineapple or fresh milk.

ANNEX 5

A. ISSUE OF RATIONS.

The issue of rations on Guadalcanal is based on Expeditionary Force Menu 1 (for Tropical and Temperate Areas), 1 October 1943. Use is made of Island grown produce obtained from a farm operated by the Army. The fresh foods thus obtained are: cucumbers, corn, green peppers, egg plant and radishes. The feeding program is established as an unsupplemented B ration with a 15 day supply of non-perishable foods maintained by periodic inventory adjustments submitted to South Pacific Base Command at Noumea. There are, however, two sources of fresh and/or frozen foods.

a. Island grown fresh vegetables.

b. Reefer ships supplying frozen meats, fresh vegetables, some fruits, compressed yeast and dairy products other than fresh milk and ice cream.

Report is made each month to Noumea on current inventory of fresh and frozen foods. Reefer ships arrive on an average of one or two per month with supplies based on projected strength figures. Prior notification of the schedules of reefer ships is radioed from Noumea, together with the cargo inventory. The quantity and variety of reefer cargo, over which Island Quartermaster has no control, is determined presumably by the availability of fresh and frozen food in New Zealand, the principal source of these items for South Pacific Base Command. The meats supplied are: beef cuts, some frozen boneless beef, carcass lamb, pork sides, lamb liver, smoked hams and shoulders, and occasionally chicken. The vegetables include unusably large quantities of cabbage and carrots, and lesser amounts of potatoes, onions and celery. Rarely, cauliflower, turnips (swedes) and frozen green beans are received. The fresh fruit is limited in quantity and consists almost exclusively of apples and pears.

The two cubic feet of refrigeration shipping space allotted per man per month, coupled with adequate island refrigeration space insure a relatively constant supply of fresh meat to the troops several times per week, subject only to fluctuations in availability at the source.

The supply to the troops of fresh vegetables and fruit is erratic. This is caused by:

a. Unpredictable condition of the produce upon arrival.

b. Relatively infrequent supply of large quantities of produce resulting in an overflow of island cooler space and forced issues during the ten days or two weeks immediately following the arrival of a shipment.

The psychological effect on the troops of disproportionately large quantities of certain items, particularly cabbage and carrots, is bad.

The dry stores are adequately protected from rain and direct sunlight. Each ration dump is made up of a number of thatched roof shelters having no sidewalls; this is particularly desirable in providing the maximum air circulation so essential in a humid climate. Crossed planks provide good dunnage over the concrete or earthen floors.

At present the island ration strength is diminishing rapidly from a recent figure of about 30,000. There are 34,000 cases of C ration on hand which had been packed February to July 1942 and is undergoing a current M unit spoilage of about 3% per month. There are 2,500 cases of K ration on hand and in good condition, 20,000 cases of 10 in 1 ration in good condition, 2,800 cases of D ration including 70,000 rations condemned as unfit for issue, 6,000 cases of the hospital ration supplement (shipped in two months ago for use by the 3rd Marine Division, but which arrived after the troops had left), some ration accessory kits and some of the Pacific Ocean Area assault packages.

Most of the B ration dry stores were in good condition. However, of a shipment of 161 cases of boned chicken packed in November and December of 1943 by the Blue Star Produce, Inc. and the Madeira Food Company, 24 cases has spoiled to date. Also grapefruit juice packed in No. 10's and V board has about a 24% spoilage rate prior to issue. The cases examined were marked R.C.V. Citrus Exchange, Contr. No. 44W28021 and had been here about 10 months. There was no date stamped on the cases. Some grapefruit in No. 3 talls with corrugations were also examined. Some of the cans were precoated and others were not. Rusting had occurred on the seams of both types of cans, and surprisingly the precoated cans showed other small rusted areas, whereas the plain tins did not. Inquiry and evidence indicated no appreciable difference in spoilage of grapefruit juice in precoated and in plain tins.

Some dry products are present in large quantities, and it was said of all the following that the turnover rate was extremely low: corned beef hash, corned beef, M & V hash, M & V stew, powdered milk (whole), uncooked wheat cereal, dehydrated carrots, dehydrated beets, dehydrated hominy, dehydrated cranberries, dehydrated pea soup, dehydrated navy bean soup, grapefruit juice, marmalade, biscuits Type I, biscuits Type II, and a tropical cooler type of hard candy.

The ration dump noncom showed that his issue of dehydrated soups during the past year has been only a few hundred pounds. At present there are 75,000 pounds of dehydrated navy bean soup on hand. There are 210,000 pounds of marmalade of a New Zealand Variety on hand; all other jams and jellies turn over at a normal rate. Type I biscuits are present in the amount of 96,000 pounds, and Type II Biscuits in the amount of 60,000 pounds.

The island refrigeration space consists of 42 boxes in banks of 6, each such multiple unit providing 6800 cu. ft. of space. A few of the boxes are maintained at about 10° F. for the meats; most of the boxes are held at 30° or higher and are used for storing the other perishables. The slow movers are cabbage, carrots, onions, cheese, and that portion of the butter which is tinned. The fast moving items are all meats (except liver), eggs, butter, potatoes, celery and cauliflower. All items were in good condition with the exception of the compressed yeast. There were 14,000 pounds on hand for supply almost exclusively to the bakery which uses only 800 pounds per week. Each incoming reefer (once or twice a month) brings in from 16,000 to 26,000 pounds of compressed yeast. The product is rubbery in texture by the time the bakery receives it, has lost a good deal of its strength, and in some cases has spoiled. The issue to the island is unquestionably too large at present.

Ice is manufactured here and supplied for troop consumption on the basis of 50 pounds/100 men. The coffee is New Caledonia grown, shipped in green, roasted and ground locally.

The present Quartermaster bakery, which has been in operation since March of 1944 initially issued bread on the basis of 20 pounds/100 men, but after a few weeks was able to increase the issue to 35 and later to 45 pounds/100 men. The present rate of issue is 35 pounds/100 men, although port battalions and service companies serving a midnight meal can obtain additional bread upon request. The bakery makes between 8,000 to 9,000 pounds of bread/day except on Fridays and Saturdays when the production is increased. No bread is baked on Sunday. Weekday production begins at 0600, ends around 1400 and is issued from 1700 to 1000 the following day (Sundays excluded). The compressed yeast is of poor quality when it arrives at the bakery. For every 2 pounds of compressed yeast used, 1-1/2 pounds of dried yeast is also used. The flour in a dough is never less than 60% New Zealand product which looks like a soft flour and presumably is not enriched. The remaining flour is the standard United States issue flour, fortified. All operations are by hand except the mixing. A crew of about 34 to 43 men is being used to turn out the day's pro-

ANNEX 5

duction of bread. White bread is usually made, but raisin bread is issued once a week.

The finished loaf frequently lacks volume and is not uniform. The relatively poor quality of the product is in part, at least, attributable to:

a. Compressed yeast arriving at the bakery in poor condition.

b. Lack of control on dough temperature by the use of ice on those days when the proper temperature of 78 to 80° is increased to the room temperature which is often in the neighborhood of 90° F.

Generally speaking, the packaging and packing of subsistence items in New Zealand is not the best. Many of the products are packed in unwieldy containers, such as 150 lb flour sacks and a wire bound wood case containing twelve No. 10's of boned chicken packed by the New Zealand branch of Swift and Co. The case has a gross weight of 100 pounds. Incidentally these No. 10 cans were soldered top and bottom rather than double seamed, and therefore are not only subject to damage caused by large case weight, but also by the inherent weakness of the cans themselves.

B. NUTRIENT INTAKE.

On the basis of a mess survey and interview with 50 men selected at random for intensive study, it was estimated that the average nutrient intake of troops on Guadalcanal during the period of the survey, was approximately that shown in Table I. In comparison with National Research Council standards protein, vitamin A, iron, and niacin were adequate while calcium, thiamine and riboflavin were low by 0.1 gm, 0.1 gm and 0.2 mgm respectively.

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TABLE 1

Average Nutrient Intake of Troops on Guadalcanal During Survey

	Guadalcanal	NRC Rec.	Colo Inf
Calories	3400		3900
Protein, gm	110	70	125
Calcium, gm	0.7	0.8	0.9
Vitamin A, I.U.	5000	5000	8000
Iron, mgm	21	12	25
Thiamine, mgm	1.6	1.7	2.1
Riboflavin, mgm	2.0	2.2	2.5
Niacin, mgm	23	17	28
Ascorbic acid, mgm	40-	75	110

It should be emphasized that during the period studied there was an almost complete lack of fresh vegetables, and of both fresh and canned fruits, and consequently the ascorbic acid and vitamin A intakes were much lower than usual for the island. Ordinarily fresh vegetables and canned fruits are available in abundance. The island nutrition officer estimated that ascorbic acid and vitamin A intakes during the month preceding this survey were 85 mgm and 12,000 I.U. respectively.

Individual soldiers vary greatly in their nutrient intakes because of difference in size, activity, dietary habits, and the quality of food served in different messes.

The following facts disclosed in the dietary interviews are of interest:

1. 56% of the men refuse to eat dehydrated potatoes.
2. 44% of the men refuse to eat dehydrated eggs served at breakfast.
3. Each of the dehydrated vegetables (other than potatoes) is refused by 25-50% of the men.
4. Evaporated and dried milk are well consumed in various drinks (egg nogs, chocolate drinks, etc.).

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TABLE 2
Distribution of Ages of Subjects

Age	% of Subjects
18 - 20	6
21 - 23	28
24 - 26	14
27 - 29	14
30 - 32	6
33 - 35	16
36 - 38	8
39 - 41	8

Guadalcanal
Means - 28 yr.

Colorado Infantrymen
24 yr.

TABLE 3

Distribution of Heights and Weights of Subjects

Heights (inches)	Weights (lbs)							Sum
	110- 119	120- 129	130- 139	140- 149	150- 159	160- 169	170- 179	
64-64 3/4	1	0	1	0	0	0	0	0
65-65 3/4	0	0	1	2	0	0	0	0
66-66 3/4	0	0	4	1	1	2	0	8
67-67 3/4	0	0	1	1	0	0	1	0
68-68 3/4	0	0	3	1	0	0	0	5
69-69 3/4	0	0	2	3	3	1	0	15
70-70 3/4	0	0	1	1	0	1	0	4
71-71 3/4	0	0	0	0	5	0	0	5
72-72 3/4	0	0	0	0	2	0	1	4
73-73 3/4	0	0	0	0	0	0	0	0
74-74 3/4	0	0	0	0	0	0	0	0
75-75 3/4	0	0	0	0	0	1	0	1
SUM	1	0	13	9	6	6	3	50

Mean Heights
68.8 inches

Guadalcanal
Colorado Infantrymen
68.8 inches

Mean Weights
155 pounds

153 pounds

TABLE 4

Distribution of Time spent in Pacific Ocean Areas by Subjects

Months	% of Subjects
13 - 18	50
19 - 24	24
25 - 30	24
31 - 36	2

TABLE 5

Distribution of Enlisted Ranks in Subjects

Grade	% of Subjects
1st	0
2nd	2
3rd	2
4th	10
5th	42
6th	36
7th	8

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C. MEDICAL HISTORY.

The pre-army medical history was entirely negative. The overseas history, however, contained significant complaints and diseases. Gastrointestinal findings of recent weight loss, anorexia, irregular eating, poor teeth were found in appreciable number. Cardiorespiratory symptoms or dizziness or faintness in the heat, precordial pain and easy fatigue occurred. Athlete's foot had been a problem in more than half the subjects and prickly heat was almost as common. Dysentery, malaria and dengue had occurred. Headaches, mental depression and various expressions of nervousness and jitters interferred with efficiency in a few and were complained of by many others. Atabrine was being taken regularly by 22%. Three subjects had been treated with quinine. Vitamin supplements had been used by a quarter of the subjects and were used currently by three. The percentage of troops with the various findings in the history is given in Table 6.

D. PHYSICAL EXAMINATION AND PHYSICAL FITNESS.

In the physical fitness test the average score was 57. Ten percent of the subjects had a good score, 58% were average and 32% rated poor. (Tables 7 and 8). Low scores were due in part to the inclusion of sedentary troops and to a high average age. Nutrition also cannot be unequivocally excluded as a factor.

The physical signs looked for are recorded in Table 7. The eyes showed no more clinical findings than were observed in Colorado. Oral hygiene was the same. Cavities and gingivitis appeared in a few subjects. There were less gingivitis and inflammation of the dental margin than in Colorado. Follicular hyperkeratosis and acneform eruption were much less common in Guadalcanal. Half of the troops exhibited epidermophytosis and 20% had miliaria. The positive physical findings were given as percentages in the table.

There was no clear cut evidence of any specific nutritional deficiency syndrome. The impression was gained that the troops on this island are not in as good condition as the garrison troops in Hawaii though clinical malnutrition was not evident.

E. BIOCHEMICAL RESULT.

The arithmetic means are shown in Table 9 for whole blood hemoglobin, total plasma protein, testing urine chloride, ascorbic acid, thiamine, and riboflavin. The data are tabulated to facilitate comparison with values obtained by the same methods on other groups of normal men. The frequency distributions of the data for Guadalcanal are shown in Table 10.

TABLE 6

Percentage of Troops with Significant Medical History

Item in History	% of Subjects
A Pre-Army History	
Pulmonary Disease	0
Skin Disease	0
Allergic Disease	0
Cardiovascular Disease	0
B Overseas History	
(1) Gastrointestinal Complaints	
Loss of Appetite	14
Poor Teeth	6
Bleeding Gums	4
Recent Weight Loss	16
Jaundice	4
Peptic Ulcer Symptoms	4
Irregular Eating Habits	8
(2) Cardiorespiratory Complaints	
Precordial Pain	6
Easy Fatigue	6
Mild Symptoms in Heat	12
Falling out in Marches	2
Poor General Efficiency	4
(3) Diseases	
Malaria	8
Dengue	8
Dysentery	14
Fever of Unknown Origin	4
Prickly Heat	40
Athlete's Foot	56
(4) Neuropsychiatric Complaints	
Headaches	6
Mental Depression	6
Nervousness	10
(5) Miscellaneous	
Joint Symptoms	4
Combat Wounds	2
Atabrine Medication - Current	22
Previous	72
Quinine Medication - Previous	6
Vitamin Supplementation - Current	6
Previous	26
Salt Tablets - Current	50
Previous	4

TABLE 7

Percentages of Troops with Significant Physical Findings

	% of Subjects Guadalcanal	Colorado Infantrymen
A Eyes		
Conjunctival Injection - slight	34	46
- moderate	6	10
Pterygia	6	10
Pigmented Sclera	16	--
Corneal Scars	2	--
Arcus Senilis	2	--
Pingueculae	48	8
B Mouth		
Gingivitis - mild	12	18
- moderate	2	0
Inflammation of Dental Margin	2	16
Swelling of Interdental Papillae	6	--
Oral Hygiene - good	40	44
- fair	50	46
- poor	10	10
Pigmentation of Oral Mucosa (Negroes 12)	14	--
Cavities	14	--
C Skin		
Follicular Hyperkeratosis	2	27
Acneform Eruption	6	21
Seborrhea	4	--
Miliaria	20	--
Epidermophytosis	50	--
Excessive Palmar Sweating	4	--
D Extremities		
Bitten Nails	6	--
Spoon Nails (slight)	6	--
Pes Planus - mild	22	--
- moderate and severe	6	--
E Neuromuscular	No positive findings	A few findings

TABLE 8

Distribution of Scores in Physical Fitness Test

Score	% of Subjects Guadalcanal	Colorado Infantrymen
20 and 25	4	0
30 and 35	16	2 poor
40 and 45	12	7
50 and 55	20	8
60 and 65	20	12 average
70 and 75	18	47
80 and 85	8	18
90 and 95	2	5 good
100 and 105	0	1
Means	57	71

Several significant points emerge from the data in Tables 9 and 10. The hemoglobin levels were normal and no subjects were in the "deficient range." Similarly, the plasma protein was normal with no subject in the "deficient range." One subject of the fifty in Guadalcanal had no detectable chloride in the urine, and must be considered chemically unsaturated with respect to sodium chloride. One subject also had a strongly positive reaction for acetone bodies, but no adequate explanation could be discovered for this finding either by direct questioning or by physical examination.

The rate of excretion of vitamins in the urine is a measure of the body stores of these substances; and the Guadalcanal group showed some differences from the Colorado group. The average for ascorbic acid was exceedingly low in Guadalcanal, and 45 percent of the group fell into the "deficient range." This finding was not unexpected in view of the observed low intake of ascorbic acid. The average for thiamine was 4 mgm. lower than in Colorado. One subject on Guadalcanal was in the "deficient range." The urinary riboflavin showed substantially the same average as in Colorado. No subject on Guadalcanal was in the "deficient range."

When all of the biochemical data for all subjects were inspected it was concluded that on Guadalcanal:

- a. No subject was deficient nutritionally with respect to water, protein, hematopoietic factors, or riboflavin.
- b. One subject was inadequately supplied with carbohydrate and salt.
- c. One subject was in the "deficient range" in thiamine excretion.
- d. A large percentage of the troops was low in ascorbic acid, and 22 of the 50 men fell within the "deficient range" in the biochemical standpoint.

F. ADDITIONAL OBSERVATIONS.

Patients on the wards of the 20th Station Hospital were examined. Malaria was found in appreciable number but in general the anti-mosquito measures and atabrine have made it relatively unimportant. Fevers of unknown origin are not uncommon but there are few of the tropical parasitic diseases. Dysentery is rare. One case of lichen planus was seen but there have not been many here. The ward population does not differ greatly from that in a municipal hospital in the states. Neuropsychiatric problems do not constitute a burden.

TABLE 9

Biochemical Averages for Troops of Guadalcanal
Compared with Averages Obtained on Colorado Infantrymen

Biochemical Determination	50 Men in Guadalcanal	Colorado Infantry
Whole blood hemoglobin (gm./100 ml.)	15.6	17.1
Plasma protein (gm./100 ml.)	6.4	6.5
Fasting urinary chloride (rdg.)	2	2
Fasting urinary ascorbic acid (mgm./hr.)	0.3	0.8
Fasting urinary thiamine (mcg./hr.)	8	12
Fasting urinary riboflavin (mcg./hr.)	27	26

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TABLE 10

Frequency Distribution of Biochemical Values of Troops on Guadalcanal

A. Hemoglobin		B. Plasma Protein	
Gm./100 ml.	% of Troops	Gm./100 ml.	% of Troops
14 - 14.4	6	5.5 - 5.9	8
14.5 - 14.9	12	6.0 - 6.4	40
15.0 - 15.4	26	6.5 - 6.9	48
15.5 - 15.9	22	7.0 - 7.4	2
16.0 - 16.4	20	7.5 - 7.9	2
16.5 - 16.9	8		
17.0 - 17.4	4		
17.5 - 17.9	2		

C. Fasting Urinary Chloride		D. Fasting Urinary Thiamine	
Reading	% of Troops	Mcg./hr.	% of Troops
0	2	1 - 3	17
1	14	4 - 6	42
2	34	7 - 9	19
3	44	10 - 12	8
4	6	13 - 15	8
		16 - 40	6

E. Fasting Urinary Riboflavin		F. Fasting Urinary Ascorbic Acid	
Mcg./hr.	% of Troops	Mgm./hr.	% of Troops
10 - 14	2	0	2
15 - 19	22	0.1	8
20 - 24	16	0.2	35
25 - 29	31	0.3	35
30 - 34	15	0.4	8
35 - 39	6	0.5	10
40 - 44	4	1.4	2
45 - 49	0		
50 - 54	4		

Morale among officers and troops was better than at Hawaii. "Tropical deterioration" did not occur though there is a clear-cut slowing of tempo, apparently a protective mechanism. Mental fatigue was noted in only a few. Recreation, meals, mail and exercise are well handled.

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The climate is typically tropical, with an average variation of mean temperature in the range of -2° F. The average maximum temperature is around 90° F., the minimum 75° F. Relative humidity is high and rarely gets below 60%. It is usually near 100% at night. A number of temperature observations were made in various types of jungle.

G. SUMMARY AND CONCLUSIONS:

1. A survey of 50 representative soldiers on the Island of Guadalcanal, 8-14 May 1945, was conducted at the 20th Station Hospital.

2. Observations included interviews on overseas dietary history, medical history and examination, a fitness test and biochemical assessment of the nutritional status of the soldiers. The Island Quartermaster was interviewed, warehousing and subsistence examined and a mess studied. Some patients in the hospital were observed.

3. The condition of the warehoused subsistence was generally excellent, with the exception of canned grapefruit juice, old C ration "M" units, and compressed yeast. The only outstanding overages of Class I supply are dehydrated navy bean soup, dehydrated pea soup, type I biscuits, type II biscuits, C ration and compressed yeast. A farm has been established and has been of good use for supplementing the B ration. Excessive issue of certain items, particularly carrots and cabbage, results in excessive waste. The figures in paragraph B are evidence of improper food preparation.

4. Although the nutritional status of the troops was in general satisfactory. There were significant differences between the troops on Guadalcanal and in Colorado which warrant attention. These are:

a. A much lower intake of ascorbic acid (40 mg. per day during the survey period); little more than half the National Research Council standard. Calcium, thiamine, and riboflavin intakes were also a little lower than National Research Council standards.

b. A lower excretion of thiamine.

c. A significantly lower ascorbic acid excretion and a much higher proportion of men in the "deficient range." (45% vs. 7%).

d. Much lower physical fitness test scores.

* See section II, "Methods, Procedure and Subjects" for criteria of "deficient range."

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ANNEX 5

V. GUAM - 29 May - 4 June 1945

A. ISSUE OF RATIONS.

The issue of rations on Guam is based on Expeditionary Force Menu No. 1 (for Tropical and Temperate Areas) 1 October 1943. Use is made of island grown produce obtained from a farm operated by Foreign Economics Administration. The fresh foods thus obtained are: okra, cucumbers, Chinese cabbage, a few tomatoes (used exclusively by hospitals), and corn. The feeding program is established as a supplemental B ration with the supply of food drawn every 20 days from the Marine Depot which handles all incoming subsistence for the island.

The refrigeration space for the 57,000 Army Troops on the island consists at present of eight 1800 cu. ft. boxes. New boxes are being set up which will in the next few weeks provide ample refrigeration facilities.

At present the dry stores are being moved from outside storage on dunnage under tarpaulins to the recently constructed warehouses (60' x 192' x 12' 0); so that within a few weeks at most, all subsistence will be warehoused. A pallet construction project, initiated by the Quartermaster, is operated by one of the service companies and all incoming subsistence will be on pallets and handled by forklifts in the new concrete-floored warehouses.

There are very few packaged rations stored by the Army on Guam. The only time they are used is to feed new garrison units upon arrival until such time as screened kitchens and latrines can be constructed. Most of the C ration present dates from 1942. There are 6,000 cases of 10 in 1 and a small number of K rations. The mounting out of combat troops is handled entirely by Island Command, not by the Army Quartermaster.

The garrison troops have been receiving, for the past few months, at least one and often two issues of fresh meat per day. The meat includes frozen boneless beef, frozen veal and lamb carcass, pork butts, smoked ham, slab bacon, frozen chicken, and occasionally frozen fish fillets. There is very little supply from New Zealand, the only exception being infrequent shipments of sacked frozen beef cuts. Cold storage eggs are issued about twice per week, although variation exists with all fresh, chilled and frozen foods depending upon the arrival of reefer ships. Fresh fruits are almost entirely oranges, apples and lemons. Reefers also bring in enough fresh potatoes to provide a daily issue, carrots, cabbage, celery and sometimes lettuce and turnips.

The Quartermaster felt that all subsistence items arrive in good shape with the exception of canned corned beef. The canned corned beef was both South American and United States. The Quartermaster said the initial spoilage upon receipt was 60% and that spoilage continues slowly among the remaining good cans as time goes on. No cause has been found for the spoilage. No items were spoiling in excessively large percentages at the time of examination. It was mentioned that potatoes in crates arrive in much better condition than potatoes in sacks; this might well be accounted for by the relative ease of bruising sacked potatoes in overseas handling.

The fastest moving B ration components here are canned bacon, boned chicken, Vienna sausage, dried eggs, cheese, gelatine dessert powder, spaghetti ("could use more"), dehydrated potatoes, all canned fruits and fruit juices. The slowest moving items are dehydrated soups, jams, marmalade, starch dessert powder, wheat and whole wheat cereals, raisins, M & V hash, M & V stew, canned corned beef and canned corned beef hash. It is of interest to note that the issue of dehydrated soup for the month of May should have been 4400 cans if the issue had been 100% accepted; actually only 422 cans were accepted by the messes. The coffee used by the Army garrison is roasted and ground, shipped from the United States packed in 20 lb. vacuum cans. Ice is issued to the messes on the basis of 1/2 lb./man/day; hospitals make additional ice. Ice cream mix has been issued once (hospitals receive a regular supply however); there are no freezers except those at the hospitals, the Air Corps Depot, and one or two improvised freezers in other organizations. These units make their own ice cream--hospitals from the ice cream mix, the others from an improvised formula. The Red Cross has doughnut machines; no outfit has machines and doughnuts are seldom made.

The issue of bread is 42 lbs./100 men. No more is available for the next month or two after which time the new bakery will be in operation. At present a need for more bread for some units is recognized, but the bakery companies are operating 3 shifts per day, 7 days per week at maximum capacity. The mixers at the bakery are machine operated; all other operations are by hand. Dried yeast is used almost exclusively at the bakery; very little baking is done in the companies.

At present troops are receiving some dairy products; eggs, cheese and butter particularly; hospital patients also receive ice cream. Soon all troops will have a bi-weekly issue of ice cream to be manufactured by the Quartermaster when the freezers arrive. In addition a herd of dairy cows has been imported, and as soon as

a pasteurization plant can be put into operation the hospital patients will receive fresh milk.

The overall picture of Class I supply is an efficient, smoothly operating unit, not only doing the best that can be done with available men and material, but asking for and getting warehouses, ice cream mixers and a host of items which insure future improvements on a ration which at this island is already very good.

B. NUTRIENT IN TAKE.

It was estimated from studies of quantities of food issued, mess operation and dietary interviews that the average nutrient intake of troops on Guam was adequate with respect to all nutrients except calcium when National Research Council recommendations are used as a standard (Table 1). Vitamin C and thiamine intakes were the highest of any command thus far studied. Vitamin C is supplied in liberal quantities in fresh vegetables (particularly cabbage), oranges, apples, fresh potatoes, grapefruit and tomato juice, and lemonade made from synthetic lemonade fortified with vitamin C. A surprisingly large proportion (90%) of the men drink lemonade. The high acceptability of the drink is probably due to the fact that it is served cold and adequately sweetened. Thiamine intake is kept at a quite high level by the issue of 42 lbs. of enriched bread per 100 men per day and by the frequent issue of pork.

The intake of specific nutrients varies considerably among different men due to their dietary habits. Each subject was interviewed regarding whether he regularly eats certain foods of greatest nutritional significance. These data are reported in Table IA. Failure to eat certain important foods may account for at least a part of the variation in individual vitamin excretions.

C. MEDICAL HISTORY.

With the exception of two instances of acne, one or more of rheumatic fever, one of chronic sinusitis and one of psoriasis, the pre-army histories were negative. In the Army and overseas there were cases of irregular eating habits, recent loss of weight, and constipation as seen in Table 6. A few had stomach trouble, but no ulcer diagnosis has been established. Recent weight loss appeared to have resulted from an increase in activity rather than reduced food intake. Athletes foot had occurred in 63%. Prickly heat occurred in significant numbers. Neuropsychiatric symptoms were absent. No atabrine, quinine or vitamins were being taken currently, but a number

took salt tablets sporadically. The percentage of troops with various findings in the history is given in Table 6.

D. PHYSICAL EXAMINATION AND PHYSICAL FITNESS.

In the physical fitness test 37% of the subjects had a good score, 51% were average and 12% rated poor. Distribution of scores is given in Table 8. The mean was 70 compared with 71 in the Colorado Infantrymen.

The positive physical findings are summarized in Table 7. Conjunctival infection was about the same as in Colorado. Oral hygiene was in general very good. Cavities and gingivitis were not common. Active epidermophytosis and miliaria were less frequent than in Guadalcanal. The positive physical findings are given in the table.

There was no evidence of any specific nutritional deficiency syndrome. The troops on this island appeared to be in as good condition as infantrymen studied in Colorado. The morale was very good.

E. BIOCHEMICAL RESULTS.

The arithmetic means are shown in Table 9 for whole blood hemoglobin, total plasma protein, fasting urine chloride, ascorbic acid, thiamine and riboflavin. Acetone bodies, mentioned later, are not listed. The data in Table 9 are tabulated to facilitate comparison with values obtained, by the same methods on infantry troops in Colorado. The frequency distributions of the data for Guam are shown in Table 10.

Several significant points can be supported by the data in Tables 9 and 10. The levels of hemoglobin, plasma protein and urine chloride were normal, and no subject was in the "deficient range." One subject on Guam had a faintly positive reaction for acetone bodies, with no obvious ill effects from or explanation for it.

The rate of excretion of vitamins is a measure of the body stores of these substances. The average for ascorbic acid was high on Guam, and only one subject fell within the biochemically "deficient range." This high average is explained by the high intake of ascorbic acid as seen in Table 1. Thiamine also was high on Guam, with no subjects in the "deficient range." This high excretion correlates well with the calculated high intake as seen in Table 1. Average riboflavin excretion was not significantly different from

that in Colorado. Three subjects fell within the "deficient ranges," without showing clinical symptoms or signs of ariboflavinosis.

When all of the biochemical data for all subjects were examined, it was concluded that on Guam:

a. Dietary intake was satisfactory with respect to: Water, salt, carbohydrate, protein, hematopoietic factors, thiamine; and high with respect to ascorbic acid.

b. The average for riboflavin was normal, but 8% of the men fell within the biochemical "deficient range."

TABLE 1

Average Nutrient Intake of Troops on Guam During Survey.

	Guam	N.R.C. Recommended	Colo. Inf.
Calories	3500	--	3900
Protein, gms.	115	70	125
Calcium, gms.	0.7	0.8	0.9
Vitamin A.I.U.	8000	5000	8000
Iron, mg.	22	12	25
Thiamine, mgm.	2.1	1.7	2.1
Riboflavin, mgm.	2.2	2.2	2.5
Niacin, mgm.	25	17	28
Ascorbic acid, mgm.	105	75	110

TABLE 1-A

Percent of Men Surveyed Who Eat Certain Foods of Greatest Nutritional Importance in the Ration Issued on Guam.

Food	Percent of Men who eat it regularly
Beef	100
Pork	88
Lamb	70
Bread	100
Milk drink	80
Fresh eggs	92
Dehydrated eggs	52
Fresh potatoes	98
Dehydrated potatoes	90
Carrots, fresh	62
Cabbage, fresh	72
Peas, canned	85
Oranges	100
Grapefruit juice	78
Tomato juice	78
Lemonade, synthetic & fresh	90

TABLE 2

Distribution of Ages of Subjects

Age	Percent of Subjects
18-20	8
21-23	35
24-26	22
27-29	8
30-32	25
33-35	2

MEAN

Guam - 26 yrs.

Colo. Inf. - 24 yrs.

TABLE 3

Distribution of Heights and Weights of 40 Subjects.

Height	Weight								Total
	120	130	140	150	160	170	180	190	
	-	-	-	-	-	-	-	-	
61-61 3/4		1							1
62-62 3/4		1							1
63-63 3/4									0
64-64 3/4		1	1	1	1				4
65-65 3/4				1					1
66-66 3/4	1	1		1		2			5
67-67 3/4		4	2	1	1	1			9
68-68 3/4			2	2	1				5
69-69 3/4		1	1	1	1	2			6
70-70 3/4			1		1	1			4
71-71 3/4				1		1			2
72-72 3/4					2				2
Total	1	9	7	8	7	7	0	1	40

Mean height: Guam - 67.8 inches Colorado Infantrymen 68.8 inches

Mean weight: Guam - 154 pounds Colorado Infantrymen 153 pounds

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TABLE 4

Distribution of Time Spent Overseas

Months	Percent of Subjects
7-12	15
13-18	30
19-24	32
25-30	15
31-36	0
37-42	5
43-48	0
49-54	3

Mean time overseas - 21 months

TABLE 5

Distribution of Enlisted Ranks

Rank	Percent of Subjects
4th	8
5th	32
6th	40
7th	20

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TABLE 6

Percentage of Troops with Significant Medical History

Item in History	% of Subjects
A Pre-Army History	
Acne	5
Psoriasis	2
Hay Fever	2
Chronic Sinusitis	2
Rheumatic Fever	2
Pulmonary Diseases	0
B Overseas History	
Anorexia	5
Poor Teeth	5
Bleeding Gums	2
Recent Weight Loss	23
Constipation	8
Ulcer Symptoms	8
Irregular Eating Habits	8
Precordial Pain	5
Edema (after long period of standing)	5
Mild Symptoms in Heat	8
Falling out on Marches	8
Malaria	0
Dengue	13
Dysentery	33
Prickly Heat	38
Athlete's Foot	63
Headaches	8
Mental Depression	0
Nervousness	0
Joint Symptoms	5
Previous Atabrine Medication	13
Current Atabrine Medication	0
Previous Quinine Medication	2
Previous Vitamin Medication	13
Previous Salt Tablet Medication	5
Current Salt Tablet Medication	40

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TABLE 7
Clinical Summary

	% of Subjects Guam	Colo. Inf.
Gross changes in opacity of sclera	32 (all slight)	72
Gross conjunctivitis - slight	43	46
- moderate	2	10
Pterygia	2	10
Pingueculae	62	8
Gingivitis	15 (all slight)	18
Oral Hygiene - good	50	44
- fair	48	46
- poor	2	10
Abnormal pigmentation of buccal mucosa	12	—
Follicular Hyperkeratosis	5 (all slight)	25
Acneform eruption - slight	8	18
- moderate	5	2
- severe	2	1
Miliaria - slight	18	—
- moderate	12	—
Dermatitis of fungus infection	12 (all slight)	—
Vascular spiders	8	—
Epidermophytosis of hands or feet		
- mild	18	—
- moderate	2	—
Pes Planus	2	—

TABLE 8

Distribution of Scores in Physical Fitness Test

Score	Guam		Colorado Infantrymen	
	% of Subjects		% of Subjects	
30	2		1	
35	0	Poor 12	1	Poor 9
40	5		2	
45	5		5	
50	0		3	
55	10		5	
60	5	Average 51	5	Average 67
65	8		7	
70	8		22	
75	20		25	
80	33		16	
85	0		2	
90	0	Good 37	3	Good 24
95	2		3	
125	2		0	

MEAN SCORE 70

MEAN 71

TABLE 9

Biochemical Averages for Troops on Guam
as Compared with Averages in Colorado Infantrymen.

Biochemical Determination	Guam	Colorado Infantrymen
Whole blood Hemoglobin (gm./100 ml.)	15.5	17.1
Plasma Protein (gm./100 ml.)	6.5	6.5
Fasting Urinary Chloride (reading)	2+	2+
Fasting Urinary Ascorbic Acid (mgm./hr.)	0.8	0.8
Fasting Urinary Thiamine (mcgm./hr.)	14	12
Fasting Urinary Riboflavin (mcgm./hr.)	24	26

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TABLE 10

Frequency Distribution of Biochemical Values of Troops on Guam.

A. Hemoglobin		B. Plasma Protein	
gm./100 ml.	% of Troops	gm./100 ml.	% of Troops
13.0-13.4	2	5.8-5.9	5
13.5-13.9	5	6.0-6.1	7
14.0-14.4	10	6.2-6.3	20
14.5-14.9	8	6.4-6.5	18
15.0-15.4	15	6.6-6.7	30
15.5-15.9	25	6.8-6.9	18
16.0-16.4	10	7.0-7.1	0
		7.2-7.3	2

C. Fasting Urinary Chloride		D. Fasting Urinary Ascorbic Acid	
Reading	% of Troops	gm./100 ml.	% of Troops
0	0	0.0-0.1	3
1	13	0.2-0.3	3
2	42	0.4-0.5	17
3	42	0.6-0.7	40
4	3	0.8-0.9	11
		1.0-1.1	6
		1.2-1.3	8
		1.4-1.5	6
		1.6-1.7	3
		2.2-2.3	3

E. Fasting Urinary Thiamine		F. Fasting Urinary Riboflavin	
mcg./hr.	% of Troops	mcgm./hr.	% of Troops
0-3	6	5-9	8
4-7	25	10-14	5
8-11	14	15-19	25
12-15	17	20-24	36
16-19	16	25-29	11
20-23	5	30-34	3
24-27	3	35-39	3
28-31	8	55-59	3
32-35	3	70-74	3
36-39	0	75-79	3
40-43	0		
44-47	3		

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G. Summary and Conclusions

1. A survey of 40 representative soldiers on Guam, 29 May - 4 June 1945, was conducted at the 204th General Hospital by a team of four observers; a medical officer, a nutrition officer, a quartermaster officer and a biochemist.

2. Observations included interviews on overseas dietary history, medical history and examinations, a fitness test and biochemical assessment of the nutritional status of the soldiers. The Island Quartermaster was interviewed, and warehousing and subsistence was examined.

3. Condition of all subsistence, except for canned corn beef, was excellent. The only outstanding overage was dehydrated soups. A farm has been established and has been of good use for supplementing B ration. The island ration contains a large proportion of fresh meat, fresh vegetables, fresh and canned fruit.

4. The nutritional status of the troops was in general good:

a. Average intake of all nutrients except calcium met National Research Council standards.

b. No evidence of any specific deficiency disease.

c. No greater incidence of clinical findings than in the Colorado infantry troops.

d. Normal weight for height.

e. Fitness test scores equal to well trained infantry-men in Colorado.

f. Biochemical results similar to Colorado except for a higher percentage of men in the "deficient" range with respect to riboflavin.

ACKNOWLEDGEMENTS

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A. Rations:

The basis of issue of rations on Iwo Jima at present is EM No. 1 (Oct '43). The plan is to issue a straight B ration; any fresh food arriving by reefer is considered as so much to the good. The troop strength for rations is approximately 32,000. The only available cooler space consists of 32 125 cu. ft. portable refrigerators providing 4000 cu. ft., or 0.125 cu. ft. per man. More refrigeration space is anticipated in the near future. The small amount of fresh food arriving at present consists of frozen boneless-beef, lamb carcass, pork, chicken, eggs, potatoes, cabbage, onions, celery, oranges, apples, grapefruit, cheese and butter. The limited cooler space limits the amounts of fresh items on hand at any given time so that fresh meat has been issued about three times per week and the other fresh items much less frequently. No fresh food in quantity arrived prior to about three weeks ago. No ice is available for issue at present. Ice cream is issued to the Post Exchange, manufactured from ice cream mix and provides mess halls and individuals with ice cream about once per week. Bread is baked in 2 pound loaves, and issued at the rate of about 37 lbs/100 men. The bakery operates in three 8 hour shifts, seven days a week.

When the Army troops arrived, the Marines were charged with the issue of rations. Army troops received K and C rations for about three or four weeks. By this time kitchens had been set up and 10 in 1 was used by some units for approximately a week. On about D plus 40 the B ration was in operation, initially with no fresh supplement and recently with an ever increasing amount of fresh foods.

There is only one warehouse constructed to date; it contains macaroni, spaghetti, biscuits and cereals. All other subsistence items are stored on plank dunnage; some are under tarpaulins and some are not. There is a 120 day supply of balanced B ration on hand. Special packaged rations are no longer issued but there are 225,000 C rations, 197,000 K rations, 186,000 10 in 1, 74,000 D rations, and 84 ration accessory packs on hand. The C ration ranges in age from the pack of 1941 up to a late '44 pack; all the recently packed cases are in excellent condition. The D ration is almost entirely 1942 pack, much of it was very moldy. The K rations were in reasonably good condition. The fact that the 10 in 1 was in good condition is particularly interesting

since a recent torrential rain washed a six foot level of volcanic soil onto that area of the ration dump which contained 10 in 1 cases. Several hundred cases were completely buried. On digging them out; the cases were soaked, but every food item in all but a few cases was in excellent condition.

No spoilage of any item in excess of an expected normal spoilage was encountered, except for a shipment of pineapple juice. The cases were labelled "cans coated to prevent rust" (Hawaiian Pineapple Co., Ltd., Contr. W 04-115 QM 7122, packed 10/44). The #10 cans were plain tin, were badly rusted and the resultant spoilage was higher than normal.

The Island Quartermaster said that canned fruit, fruit juices and fresh food were the fast movers. There is a very slow turnover of all canned meats, type II biscuits, dehydrated soups and lemon juice powder, synthetic.

All unloading from ships has to be done with amphibious trucks. Despite this and many other difficulties, the handling and storage of class I supplies is an example of Quartermaster operations under many handicaps operating at its best.

B. Nutrient Intake.

The average nutrient intake of the garrison forces was estimated to be approximately that shown in Table I. The average intake of all nutrients met National Research Council standards except for riboflavin and calcium which were low by 0.3 mgm. and 0.1 gm. respectively. A small but significant proportion of men fail to eat foods of most importance nutritionally. As it becomes possible to supply more fresh foods, the ration will be a better one from the standpoint of both nutrition and palatability.

C. Medical History.

The pre-army medical history was negative except for three cases of jaundice and one case of malaria. The overseas history contained many instances of disease of minor or major nature. Anorexia was fairly common and slightly more than half had suffered recent loss of weight. Constipation occurred in ten (10) percent and three (3) subjects complained of poor teeth. Edema, easy fatigue, exhaustion, palpitation occurred in a few. Twelve (12) percent had fallen out in marches and six (6) percent were intolerant of the heat. In one (1) subject some physical deterioration was

blamed on work in the tropics. Malaria, dengue and dysentery occurred in six (6), eight (8), and twelve (12) percent respectively, while four (4) percent had had fever of unknown origin. Prickly heat had been troublesome in fifty-three (53) percent and athlete's foot in seventy-one (71) percent. Headaches were rather common and were attributed to the sun. Several had had some form of arthritis. Atabrine was taken currently by none and had been used by only eight (8) percent. Ten (10) percent were taking vitamins regularly and fourteen (14) percent had used them previously. Salt tablets were used routinely by fifty-five (55) percent. The tabulated figures are given in Table 6.

D. Physical Fitness.

The distribution of scores on the step test is given in Table 7. Only two (2) percent rated poor, fifty-seven (57) percent averages and forty-one (41) percent rated good. The average score of 76 is higher than was observed in infantrymen in Colorado.

E. Physical Examination.

The positive physical findings are summarized in Table 8. In general the eyes showed considerable evidence of trauma from sun and dust. Gingivitis and poor or only fair oral hygiene were common. Folliculitis or miliaria occurred in more than half the subjects, but epidermophytosis was not very common. There was no case of specific vitamin deficiency syndrome. The average weight was approximately five pounds under the average per POA in men of the same height. The physical and emotional status of the subjects was remarkably good, and if it had been bad previously recovery had removed the evidence.

F. Biochemical Results.

The arithmetic means shown in Table 9 for whole blood hemoglobin, plasma protein, urinary chloride, ascorbic acid, thiamine and riboflavin. Acetone bodies, mentioned later are not listed as all samples were negative. Data in Table 9 are tabulated to facilitate comparison with values obtained in Colorado by the same methods; and the frequency distributions for Iwo Jima are listed in Table 10.

Several significant points are supported by the biochemical evidence. Hemoglobin was normal and no subject was within the "deficient range." Plasma proteins were normal, and no subject was in the "deficient range." Urine chloride was normal with no

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deficiencies; and no subject's specimen showed a positive nitro-prusside reaction.

The rate of excretion of vitamins in the urine before breakfast is a measure of the body stores of these substances. On Iwo Jima the average for ascorbic acid, riboflavin and thiamine were normal and not statistically significantly different from Colorado except for ascorbic acid. On Iwo Jima, 5% of subjects fell within the biochemically "deficient range" with respect to ascorbic acid; 2% with respect to thiamine; and 9% with respect to riboflavin. The percentage in the case of riboflavin is significantly higher than Colorado. Thiamine and ascorbic acid are not.

When all of the biochemical evidence was examined for each subject, it was concluded that on Iwo Jima, 10-11 June 1945.

(a) Dietary intake was adequate with respect to water; salt; carbohydrate and total calories; protein; hematopoietic factors; thiamine and ascorbic acid.

(b) The average for riboflavin was the same as on the mainland, but a higher proportion of men were in the "deficient range."

(c) A small but significant percentage of the men examined were biochemically low enough to be classed as "deficient" with respect to ascorbic acid, thiamine and riboflavin.

TABLE 1

Approximate Nutrient Intake of Troops on Iwo Jima.

	Iwo Jima	NRC	Colo. Inf.
Calories	3500		3900
Protein, gm.	115	70	125
Calcium, gm.	0.7	0.8	0.9
Iron, mgm.	22	12	25
Vitamin A, I.U.	7000	5000	8000
Thiamine, mgm.	1.8	1.7	2.1
Riboflavin, mgm.	1.9	2.2	2.5
Niacin, mgm.	22	17	28
Ascorbic Acid, mgm.	75	75	110

TABLE 2

Distribution of Ages

Age	Percent of Subjects
18 - 19	9
20 - 21	18
22 - 23	13
24 - 25	9
26 - 27	20
28 - 29	4
30 - 31	5
32 - 33	5
34 - 35	4
36 - 37	7
38 - 39	4
40 - 41	2

Iwo Jima

Colo. Inf.

Mean Age - 26 yr

24 yr

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TABLE 3
Distribution of Heights and Weights

Height	Weight													Sum
	110- 119	120- 129	130- 139	140- 149	150- 159	160- 169	170- 179	180- 189	190- 199	200- 209	210- 219	220- 229	230- 239	
64 --														
64 3/4		2	2											4
65 --														
65 3/4	1	1		1										3
66 --														
66 3/4	3	2	2		1	1								9
67 --														
67 3/4			3	3	2									8
68 --														
68 3/4			3	1	1	1								6
69														
69 3/4		1	2		1									4
70 --														
70 3/4	1			1	1	1				1				5
71 --														
71 3/4	1			1	1				1		1		1	6
72 --														
72 3/4				1			1	1	1					4
73 --														
73 3/4			1		1			1						3
74 --														
74 3/4					1		1							2
75														
75 3/4								1	1					2
TOTAL	4	7	12	10	8	4	3	3	3	0	1	0	1	56

Mean Height --
Mean Weight --

Iwo Jima
69.1 inch
150 lb.

Colo. Inf.
68.8 inch
153 lb.

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TABLE 4

Distribution of Time Served Overseas

Months Overseas	Percent of Subjects
0 - 5	14
6 - 11	30
12 - 17	25
18 - 23	7
24 - 29	11
30 - 35	4
36 - 41	7
42 - 47	2

TABLE 5

Distribution of Grade

Grade	Percent of Subjects
3	2
4	20
5	20
6	47
7	11

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TABLE 6

Percentage of troops with significant medical history.

Item in History	Percent of Subjects
Infectious hepatitis (pre-army)	6
Anorexia	16
Bad teeth	6
Recent Weight Loss	55
Constipation	10
Cough	2
Palpitation	2
Falling out in marches	12
Edema	2
Dyspnea	4
Easy fatigue	2
Heat intolerance	6
Malaria	6
Dengue	8
Dysentery	12
Fever U.C.	4
Prickly Heat	53
Athlete's Foot and fungus infection	71
Headaches	16
Joint trouble	8
Exhaustion	2
Previous atabrine medication	8
Previous vitamin medication	14
Current vitamin medication	10
Current salt tablet medication	55

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TABLE 7

Distribution of Step Test Scores

Score	Percent of Subjects	
	Iwo Jima	Colorado Infantrymen
30	0	1
35	2 (2)	1 (9) Poor
40	0	2
45	0	5
50	2	3
55	5	5
60	4 (57)	5 (67) Average
65	7	7
70	12	22
75	27	25
80	14	16
85	0	2
90	16 (41)	3 (24) Good
95	11	3
Mean	76	71

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TABLE 8
Clinical Summary

	Percent of Subjects	
	Iwo Jima	Colo. Inf.
Gross changes in opacity of sclera	12	72
Gross changes in opacity of cornea	2	2
Gross conjunctivitis - slight	64	46
Gross conjunctivitis - moderate	10	10
Gross conjunctivitis - severe	2	10
Pterygia	6	10
Pingueculae	48	8
Gingivitis	24	18
Swelling of interdental papillae	16	--
Significant cavities	8	--
Oral hygiene - good	24	44
Oral hygiene - fair	68	46
Oral hygiene - poor	8	10
Buccal pigmentation	10	--
Folliculitis	26	--
Acneform dermatitis	2	21
Seborrheic dermatitis	2	--
Miliaria	32	--
Epidermophytosis	14	--
Pes planus	6	--

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TABLE 9

Biochemical Averages for Troops on Iwo Jima as
Compared with Averages of Colorado Infantrymen.

Biochemical Determination	Iwo Jima	Colorado Infantrymen
Whole blood hemoglobin (gm. per 100 ml.)	15.9	17.1
Plasma protein (gm. per 100 ml.)	6.6	6.5
Fasting Urinary Chloride (reading)	2	2
Fasting Urinary ascorbic acid (mgm/hr.)	0.6	0.8
Fasting Urinary Thiamine (mcgm/hr.)	9	12
Fasting Urinary Riboflavin (mcgm/hr.)	23	26

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TABLE 10

Distribution of Biochemical Values

A. Hemoglobin		B. Plasma Protein	
gm./100 ml.	% of Subjects	gm./100 ml.	% of Subjects
13.2 - 13.5	2	6.0 - 6.1	6
13.6 - 13.9	4	6.2 - 6.3	16
14.0 - 14.3	6	6.4 - 6.5	28
14.4 - 14.7	10	6.6 - 6.7	8
14.8 - 15.1	26	6.8 - 6.9	30
15.2 - 15.5	10	7.0 - 7.1	6
15.6 - 15.9	20	7.2 - 7.3	0
16.0 - 16.3	6	7.4 - 7.5	2
16.4 - 16.7	14	7.6 - 7.7	4
16.8 - 17.1	2		

C. Fasting Urinary Chloride		D. Fasting Urinary Ascorbic Acid	
Reading	% of Subjects	mgm/hr.	% of Subjects
1	2	.2 - .3	14
2	63	.4 - .5	40
3	35	.6 - .7	24
4	0	.8 - .9	14
		1.2 - 1.3	2
		1.6 - 1.7	2
		1.8 - 1.9	2
		2.4 - 2.5	2

E. Fasting Urinary Thiamine		F. Fasting Urinary Riboflavin	
Megm/hr.	% of Subjects	mcgm/hr.	% of Subjects
0 - 4	42	0 - 4	0
5 - 9	24	5 - 9	10
10 - 14	20	10 - 14	16
15 - 19	6	15 - 19	24
20 - 24	0	20 - 24	24
25 - 29	0	25 - 29	8
30 - 34	2	30 - 34	6
35 - 39	2	35 - 39	0
40 - 44	0	40 - 44	2
45 - 49	2	45 - 49	4
50 - 54	2	55 - 59	2
		80 - 84	4

G. SUMMARY AND CONCLUSION

1. A survey of 56 representative soldiers on Iwo Jima was conducted at the 232nd General Hospital on 10 and 11 June.

2. Observations included interviews on overseas dietary history, medical history, medical examination, a fitness test, and biochemical assessment of nutritional status of the subjects. The island quartermaster was interviewed and warehousing and subsistence examined.

3. Condition of all subsistence was excellent. The ration in use is based on E. F. M. #1 (Oct 1943). Small quantities of fresh and frozen foods have recently been available.

4. The subjects showed no clinical signs of nutritional deficiency.

5. Physical fitness test scores averaged higher than in infantry troops in Colorado.

6. The average biochemical levels in the blood and urine were satisfactory. However, 5% were "deficient" in ascorbic acid, 9% in riboflavin, and 2% in thiamine.

ACKNOWLEDGEMENTS

We wish to express our gratitude to all personnel on Iwo Jima who assisted with this investigation, particularly the following: Lt. Colonel Curry, AGF Surgeon; Major James Long, Deputy Surgeon; Lt. Colonel Hartman, S-1; Lt. Colonel Singe, Commanding Officer, 232nd General Hospital; Major Dickerson, Laboratory Chief, 232nd General Hospital; Major Davenport, Major Moore and Captain Stone, Island Quartermaster, Executive, and Depot Supply Officer, respectively; and T/5 March and Pfc Anderson of the 232nd General Hospital. The exceptional courtesy and hospitality shown to us at all times made our stay pleasant and profitable.

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VII CASUALTIES FROM OKINAWA 29 May - 9 June 1945.

A. Rations:

Since all subjects studied on Saipan were casualties recently evacuated from Okinawa, it was felt that ration information should be more concerned with these men than with the Quartermaster policy and practice within the island garrison (the latter is essentially the same as was found on Guam.)

The Marine and Army evacuees who had made the assault on Okinawa carried two canteens of water with them on the operation, and the ration varied with the outfit. Some carried 2 days K and 2 D bars, some carried 3 days K. It was agreed by all that the amount of food carried in on the assault was largely decided by the individual within the limits of the operational plan, which calls for a specific ration or combination of rations for a given assault.

Everyone mentioned the fact that on the first day there was not much time or desire for food. Daily resupply was always the plan for providing food to the front line troops, although one man had not received resupply until D plus 2.

Once the line was established, C and/or K (usually C) was provided for front line troops, and supplemented with buns and coffee after the first few days. In the rest areas, where the men could congregate in larger groups, the 10 in 1 was used exclusively until kitchens could be brought in and established. Then a straight B ration was used.

"Joe," as both Marines and Army affectionately designate coffee, is the item most in demand at the front. Many said that you could always look around and see someone brewing coffee. Wherever a momentary let-up occurred, one or two men would remain in the holes (usually two-man fox holes) and several others would go back a few yards and make a cup of coffee. Opinion was about equally divided for and against on the subject of soluble coffee; several men wanted to know why ordinary coffee could not be included in the packaged rations.

B. Medical History:

The pre-army medical history was largely negative. Tuberculosis, allergy and chronic sinusitis had occurred in a few subjects. The overseas history was strikingly different, present

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many instances of trauma and medical disease since the subjects studied had been evacuated because of wounds and medical disorders. Loss of appetite, poor teeth and bleeding gums were relatively uncommon. Loss of weight in combat was reported by 65%. Ulcer symptoms without demonstrable ulcers were noted in 10%. A number of the subjects had been intolerant to heat, experiencing collapse, syncope and heat exhaustion during their training and combat in tropical areas. There had been no malaria, but a quarter had had dengue and 35% dysentery. Prickly heat had been troublesome to 40% and fungus infection, jungle sores or athlete's foot had occurred in 69%. The entire pertinent medical experience, including medication with atabrine, vitamins and salt is given in Table 5. There was extreme irregularity in atabrine medication during the Okinawa campaign as compared with Leyte when administration was by roster.

C. Physical Examination:

The positive physical findings are summarized in Table 6. The eyes showed very few differences from those seen in garrison troops in Hawaii, Guadalcanal and Guam. Changes in opacity of sclera were much less frequent than in Colorado. Gingivitis was more common and the oral hygiene showed more evidence of neglect than elsewhere in Pacific Ocean Area or in Colorado. Miliaria was less common in the present subjects than elsewhere in Pacific Ocean Area, while fungus infection was much more common. There was one case of post-diphtheritic peripheral neuropathy and one case of unilateral cheilosis associated with a higher than average riboflavin excretion. In general, the subjects appeared to be in worse physical condition than troops seen elsewhere in Pacific Ocean Area and showed the traumatic physical and emotional effects of long campaigns and active combat. The average body weight was normal for the average height.

D. Biochemical Results:

Interpretation of the biochemical results on the Okinawa casualties must be made with the consideration fully in mind that the patients had been eating a hospital diet for periods up to ten days after becoming casualties. However, from what is known of experimentally induced dietary deficiencies, it is reasonable to expect that serious deficiencies of the vitamins, hematopoietic factors and proteins would not have been repaired fully in this period. The effects of acute deficiency of water, salt or calories would probably not be apparent any longer after

a week's hospital diet. With these considerations in mind, we may turn to the results (Tables 7 and 8).

Hemoglobin was on the average significantly lower in this group than in any other observed in the Pacific Ocean Area, but no patient was in the "deficient range." Plasma protein was the same as in the rest of the Pacific Ocean Area and in Colorado and no patient was in the "deficient range." None was dehydrated.

Urinary chloride was somewhat lower in the Okinawa group than in the rest of Pacific Ocean Area, but no subject was in the deficient range. There was no ketonuria.

The average urinary ascorbic acid was lower than the Pacific Ocean Area garrison average and the Colorado troops. There were four individuals who fell within the "deficient range." Urinary thiamine was on the average the same as in the rest of the Pacific Ocean Area except for Guam. It was lower than in Colorado. No subject, however, was in the "deficient range." Average riboflavin excretion was not significantly lower than the average of the Pacific Ocean Area garrison but was 5 mgm. lower than in Colorado. 6% of the subjects were in the "deficient range."

In Summary:

a. For Okinawa casualties who had been on hospital rations for period from one day to two weeks, the biochemical status was, on the whole, satisfactory with respect to water, total calories, salt, hematopoietic factors, protein, and vitamins C, B₁, and B₂.

b. A small but significant percentage of men fell within the biochemically "deficient range" with respect to riboflavin (6%) and ascorbic acid (8%). None was in the "deficient range" with respect to hemoglobin, plasma protein, chloride or thiamine.

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TABLE 1
Distribution of Ages of Subjects

Age	Percent of Subjects
18-19	14
20-21	14
22-23	12
24-25	14
26-27	10
28-29	8
30-31	8
32-33	2
34-35	8
36-37	2
38-39	4
40-41	2

MEAN AGE — 26.5 years

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TABLE 2

Distribution of Heights and Weights of Subjects

Heights (inches)	120-129	130-139	140-149	150-159	160-169	170-179	180-189	190-199	200-209	Sum
63 - 63 3/4										1
64 - 64 3/4										0
65 - 65 3/4										2
66 - 66 3/4										5
67 - 67 3/4										10
68 - 68 3/4										6
69 - 69 3/4										5
70 - 70 3/4										3
71 - 71 3/4										4
72 - 72 3/4										10
73 - 73 3/4										2
74 - 74 3/4										1
SUM	2	13	8	14	8	1	1	1	1	49

Mean Height - Okinawa 69.4 in. Colo. Inf.
68.8 in.

Mean Weight - 155 lbs. 153 lbs.

TABLE 3

Distribution of Time Spent Overseas by Subjects.

Time, months	% of Subjects
0 - 5	8
6 - 11	27
12 - 17	27
18 - 23	10
24 - 29	20
30 - 35	2
36 - 41	4
60 - 65	2

MEAN - 23 Months

TABLE 4

Distribution of Grades

Grade	% of Subjects
Captain	2
1st Lt.	2
Ensign	2
Enlisted 1	2
2	10
3	14
4	8
5	12
6	42
7	6

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TABLE 5

Percentage of Troops with Significant Medical History

Item in History	% of Subjects
A. Pre-Army History	
Tuberculosis	4
Allergy	2
Chronic Sinusitis	4
B. Overseas History	
Anorexia	6
Poor Teeth	4
Bleeding Gums	4
Recent Weight Loss	65
Constipation	2
Jaundice	4
Ulcer Symptoms	10
Precordial Pain	4
Heat Intolerance	14
Falling Out on Marches	4
Malaria	0
Dengue	24
Dysentery	35
Prickly Heat	40
Fungus Infection or Athlete's Foot	69
Headaches	4
Current Atabrine Medication	69
Previous Atabrine Medication	10
Current Vitamin Medication	24
Previous Vitamin Medication	34
Current Salt Tablet Medication	36
Previous Salt Tablet Medication	14

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TABLE 6

Percentages of Troops with Significant Physical Findings

	% of Subject		
	Okinawa	POA Garrison Average	Colo. Inf.
A. Eyes			
Gross changes in opacity of sclera (all slight)	18	20	70
Conjunctival Infection - slight	42	47	46
- moderate	6	6	10
Pterygia	12	4	10
B. Mouth			
Gingivitis - slight	24	16	18
- moderate	4	0.3	0
Inflammation of Dental Margin	2	1	16
Swelling of Interdental Papillae	8	6	—
Oral Hygiene - good	14	41	44
- fair	68	54	46
- poor	18	5	10
Buccal pigmentation	2	12	—
Significant cavities	10	—	—
Cheilosis	2	0	6
C. Skin			
Acneform eruption - slight	4	5	18
- moderate	4	4	3
Miliaria	8	28	—
Fungus infection - slight	8	3	—
- severe	12	3	—
Epidermophytosis (feet)	30	22	—
D. Extremities			
Bitten nails	10	—	—
Pes Planus	2	7	—
E. Neuromuscular			
Absent knee jerks	2	0.1	0.3
Absent ankle jerks	2	0	0.2

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TABLE 7

Biochemical Averages for Okinawa Casualties Compared with Averages for Garrison Troops in POA and with Colorado Infantrymen.

Biochemical Determination	Okinawa	POA Garrison Average	Colorado Infantrymen
Whole Blood Hemoglobin (gm./100 ml.)	14.8	15.3	17.1
Plasma Protein (gm./100 ml.)	6.5	6.5	6.5
Fasting Urinary Chloride (rdg.)	2	2+	2+
Fasting Urinary Ascorbic Acid (mgm./hr.)	0.5	0.7	0.8
Fasting Urinary Thiamine (mcg./hr.)	7	11.5	12
Fasting Urinary Riboflavin (mcg./hr.)	21	24	26

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TABLE 8

Distribution of Biochemical Values in 38th Division

A. Hemoglobin		B. Plasma Protein	
gm./100 ml.	% of Subjects	gm./100 ml.	% of Subjects
12.4-12.9	2	5.6-5.7	2
13.0-13.5	10	5.8-5.9	8
13.6-14.1	19	6.0-6.1	8
14.2-14.7	17	6.2-6.3	17
14.8-15.3	19	6.4-6.5	31
15.4-15.9	23	6.6-6.7	13
16.0-16.5	8	6.8-6.9	11
16.6-17.1	2	7.0-7.1	0
		7.2-7.3	8
		7.4-7.5	2

C. Urinary Chloride		D. Urinary Ascorbic	
Reading	% of Subjects	Acid mgm./hr.	% of Subjects
0	0	.1 - .2	8
1	12	.3 - .4	27
2	63	.5 - .6	49
3	21	.7 - .8	10
4	4	.9 - 1.0	2
		1.1 - 1.2	2
		1.3 - 1.4	2

E. Urinary Thiamine		F. Urinary Riboflavin	
mcg./hr.	% of Subjects	mcg./hr.	% of Subjects
2 - 3	19	3 - 5	2
4 - 5	21	6 - 8	2
6 - 7	12	9 - 11	11
8 - 9	21	12 - 14	15
10 - 11	15	15 - 17	8
12 - 13	10	18 - 20	13
14 - 15	2	21 - 23	15
		24 - 26	6
		27 - 29	13
		30 - 32	11
		33 - 35	2
		36 - 45	2

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E. Summary:

1. A nutritional study was made of 49 recent relatively minor casualties from Okinawa, some evacuated by air to Guam and some evacuated by sea to Saipan. The hospitalization terms had been from one to fourteen days.

2. Their rations had been C, K or both in the front lines; 10 in 1 in rear areas; and straight B ration after kitchens were established.

3. Medical history, physical examination and biochemical measurements on blood and urine showed the following:

a. No cases of specific nutritional deficiency disease were detected.

b. The average body weight was normal for the average height. Those evacuated by air were slightly lighter for height than were those evacuated by sea.

c. Biochemical status was on the average satisfactory with respect to water, total calories, salt, hematopoietic factors, protein and vitamins C, B1 and B2. None was in the "deficient range" with respect to hemoglobin, plasma protein, chloride or thiamine; but 6% were in this range with respect to riboflavin and 8% with respect to ascorbic acid.

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VIII GENERAL SUMMARY

A. Resume of Class I Supply in Pacific Ocean Area.

The B ration is issued to all garrison troops and at the time of the study was being supplemented with fresh and frozen produce as indicated in Table I below. Other pertinent facts are included in the table for purposes of comparison:

TABLE 1

	Hawaii	Guadalcanal	Guam & Saipan	Iwo Jima
Allotted shipping space, fresh produce	1 cu ft	2 cu ft	2 cu ft	Not established
QM refrigeration capacity	Not known	Not known	.25 cu ft	.12 cu ft
Frozen meat issue (1)	5 or 6 times/wk	5 or 6 times/wk	1 or 2 issues /day	3 times/wk
Fresh fruits (2)	Yes	Yes	Yes	Yes
Fresh vegetables (3)	Yes	Yes	Yes	A few
FEA farms	No	Yes	Yes	No
Native produce (4)	Yes	No	No	No
Bread issue, lbs/100 men day (5)	50	35	42	37
Ice issue, lbs/men/day	Some	1/2	1/2	None
Ice cream issue	Very little	56 lbs/100 rations/wk	1/wk	PX only

- (1) Frozen meats include boneless beef, lamb carcass, chicken, and pork lions. There is also a supply of hams and bacon.
- (2) Fruits were limited almost entirely to apples and oranges. There are also a few lemons and grapefruit.
- (3) Vegetables include potatoes, onions, cabbage and sometimes cucumbers, celery, cauliflower, corn, carrots and turnips.
- (4) Island grown celery, tomatoes, cucumbers and lettuce are used in some places.
- (5) Additional bread can be made available upon request.

No fresh milk is available west of San Francisco; powdered milk is seldom used as a beverage.

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Every island maintains an adequate supply of B ration reserve. Special ration stock piles are also on hand as shown in Table II.

TABLE 2

Ration	Hawaii	Guadalcanal	Guam	Saipan	Iwo Jima
10 in 1	10,000	20,000	60,000	6,000,000	186,000
C (1)	1944 pack	270,000	(Handled by Navy figures not available)	Yes	225,000
K (2)	None	29,800		Yes	197,000
D (3)	1942 pack	129,600		Yes	74,000
Accessory pack	-----	Yes	-----	-----	84,000
Hospital ration supplement	-----	Yes	-----	-----	-----
Kitchen spice pack	No	No	No	No	No

(1) C ration dates from 1942.

(2) K ration dates from 1943.

(3) D ration dates from 1941.

There are large unbalanced stock piles of B ration canned meats (especially corned beef, corned beef hash and M & V stew) at every island. The amounts on hand and incoming are often more than sufficient to provide an unsupplemented B ration. Meanwhile reefers bring in fresh meat in quantities adequate to provide an issue of fresh meat three to seven or more times per week. There are very large stocks of dehydrated soups and of type I and II biscuits for use with the B ration.

Reefer space cannot be considered adequate, but the Quartermaster at each island surveyed agreed that the situation was better now than ever before and that there was every indication that it would improve further in time.

Bakeries are operating near capacity, and on the whole, are turning out an excellent product. While the issue of bread is somewhat under 50/lbs/100 men, there is little indication that any shortage exists, and most of the bakeries had information on hand to support their contention that an increase over the quantity of bread they were currently issuing had in the past resulted in non-acceptance of the full issue, with resultant waste.

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Ice cream is scarce. In a hot climate, it is probably one of the most welcome components of the ration. Any of the fresh and frozen foods are preferred to the same product canned or dehydrated.

As the fighting front has moved north, it has left island garrisons with quantities of special packaged rations, and certain components of the B ration (those components supplanted by the arrival of the fresh counterpart by reefer ship) in quantities which are frequently far in excess of anticipated use at that island, either for garrison use or for mounting operations.

B. Ration Acceptability.

The acceptability of rations by troops is dependent upon three important factors:

1. Kind and quality of foods issued to the mess.
2. Skill with which the food is prepared and served.
3. Failure to utilize all the components of the ration. (Very few messes prepare the quantity of pastries and other baked products as planned in the expeditionary force ration menu.) It was impossible with the personnel available and the time allotted to make systematic observations of food preparation. The impression was gained, however, that the acceptability of the food varied greatly among messes which received identical issues. Rather complete data were obtained on the relative acceptability of different foods. Four types of information were utilized in studying acceptability; (1) quantities of different items refused or turned back by messing units; (2) interviews with a sample (usually 50 subjects) of men from each island regarding what available foods he seldom or never eats; (3) stocks on hand in Quartermaster rations dumps; and (4) opinions of Quartermaster officers. These four factors of information, separately obtained, gave answers which agreed together.

In the B ration the fresh meats are more desired than any of the canned meat products. Three of the canned meats are particularly disliked. These are: corned beef, corned beef hash and meat & vegetable stew. The Australian version of these products is the worst, but the American-made products are also unacceptable.

Dehydrated foods in general are not liked, especially when poorly prepared. The most acceptable dehydrated products are sweet potatoes, julienne style white potatoes, cranberries and onion flakes (as seasoning only). Carrots, beets, cabbage and soups

are thoroughly disliked. It is of interest to note that there is about a year's supply of dehydrated beets and dehydrated carrots in the Pacific Ocean Area at present. The arrival of fresh vegetables and continuing supply of dehydrated beets and carrots can mean nothing but an increasingly unusable surplus of these two products.

Dried eggs, particularly the latest packs, when properly prepared are a reasonable substitute for fresh scrambled eggs. Unfortunately, about one third of the men interviewed are so prejudiced against the dried egg product of a couple of years ago that they never eat dried eggs at all except when used in baked products. Improper preparation of dehydrated eggs is widespread.

Type I and Type II biscuits as a part of the B ration are totally unused as such. Small quantities may be used in meat loaf and similar products, but there is a great surplus of these biscuits in the Pacific Ocean Area since bread is available in satisfactory quantities to the troops on all islands studied.

Lemon juice powder makes an acceptable drink in the tropics and becomes highly acceptable when sufficient ice and sugar are available. Sufficient ice and sugar are usually available in B ration feeding; this is not true of special ration feeding in the front lines.

Increasing supply of fresh meats, fruits, vegetables and dairy products is making the ration much more acceptable as time goes on. All garrison troops are adequately supplied with butter. Little or no use of Army spread is made, either in cooking or at the mess table, but it is used in making bread on some islands.

The acceptability of the special rations by infantry troops was invariably in the following descending order: the new C ration, the 10 in 1, K ration, old C ration, and D ration. The high acceptability of the new C ration is due in part to greatly improved components and, in contrast with the 10 in 1 ration, to its more convenient use at the front. In most cases where the 10 in 1 ration could be used, the B ration could equally well be used. The 10 in 1 is used largely as a source of luxury items.

In the new C ration the unacceptable and little used items are: all biscuits except those in the noon meal; and the ham, egg, and potato.

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C. Subjects Studied.

The subjects selected on each island in accordance with the plan outlined in "PROCEDURE" were found to be quite representative from the standpoint of age, type of activity, and overseas service. Some of these data are summarized in tables 3, 4 and 5.

TABLE 3

Average Ages of Men Studied

Place	Mean Age
Hawaii	29
Guadalcanal	28
Guam	26
Iwo Jima	26
Average POW (excluding Okinawa)*	26
Okinawa casualties	26
Infantry Battalion, Colorado	24

* Weighted according to troop strength

TABLE 4

Distribution (%) of Grades in Men Studied

Grades	Hawaii	Guadal- canal	Guam	Iwo Jima	Average POA	Okinawa Casualties
Capt						2
1st Lt						2
2d Lt						2
<u>Enlisted</u>						
1st						2
2d		2			0.3	10
3d		2		2	0.9	14
4th	12	10	8	20	12.0	8
5th	22	42	32	20	29.3	12
6th	60	36	40	47	42.5	42
7th	6	8	20	11	15.0	6

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TABLE 5

Average Time Served in POA by Men Studied

Place	Time (months)
Hawaii	23
Guadalcanal	20
Guam	21
Iwo Jima	17
Average POA - (excluding Okinawa)*	20
Okinawa Casualties	23

* Weighted according to troop strength.

D. Nutrient Intake

Table 6 shows the estimated nutrient intake of representative troops at the time of the survey. When these intakes are compared with those recommended by the Food and Nutrition Board of the National Research Council (Table 6) it will be noted that on all islands the intakes of protein, iron, vitamin A, and niacin were considerably above those recommended. In all islands calcium intake was 0.1 gram lower. Thiamine was slightly low on Guadalcanal. Riboflavin was slightly low on all islands except Guam. Ascorbic acid was adequate everywhere except on Guadalcanal where the intake was unusually low. The intakes of the Colorado infantrymen are shown in order to aid in interpretation of biochemical values reported later.

It should be emphasized that these values are averages and that individuals may differ in their requirements and most certainly do differ in their intakes.

With the increasing issue of fresh and frozen meats and the universal use of fortified bread, the intake of the B vitamins will be materially increased. The maintenance of an ascorbic acid intake of 75 mgs. or above is dependent, at least until sizable quantities of citrus fruits are available, upon preparing lemon powder and other fortified beverages so they will be consumed. Consumption of such beverages was satisfactory on all islands except Guadalcanal, where an unfortified Australian beverage was in use. This is contrary to opinions previously given to the Office of the Quartermaster General by observers in Hollandia and Leyte. However, the much more extensive studies reported here correlated with actual urinary vitamin excretion data indicates that lemon juice powder is consumed in this theater.

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TABLE 6

Estimated Nutrient Intake at Time of Survey

	Hawaii	Guadal-canal	Guam	Iwo Jima	POA* Average	NRC** Allowance	Colo. Inf.
Calories	3400	3400	3500	3500	3500	--	3900
Protein, gms	110	110	115	115	114	70	125
Calcium, gms	0.7	0.7	0.7	0.7	0.7	0.8	0.9
Iron, mgms	22	21	22	22	22	12	25
Vitamin A, I.U.	10,000	5000	8000	7000	7400	5000	8000
Thiamine, mgms	1.0	1.6	2.1	1.8	1.9	1.7	2.1
Riboflavin, mgms	2.1	2.0	2.2	1.9	2.1	2.2	2.5
Niacin, mgms	25	23	25	22	24	17	28
Ascorbic acid, mgms	75	40	105	75	85	75	110

* Weighted according to troop strength.

** Dietary allowances recommended by the National Research Council for adult male of average size. Its recommendations for 18-20 year old males are substantially higher with respect to protein, calcium and ascorbic acid. No calorie requirements is given because it varies with the size and activity of the individual.

E. Medical History

The medical approach used in the present nutrition survey included a medical history stressing chiefly signs and symptoms commonly attributed to general and specific deficiencies of diet as well as diseases which might interfere with nutrition; and a physical examination of the eyes, mouth, skin and neuromuscular system. In addition, a physical fitness test was done on all subjects except hospital patients.

The essential findings in each group have been covered in the individual sections and are summarized in the tables. Pre-army history was substantially negative, with no more than one to three subjects having any of the conditions noted in Table 7. The previous history

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of specific diseases included any which had occurred during the entire period whereas the history of changes in appetite, weight loss and the other symptoms investigated was limited to the recent past (2-4 months). Recent history of bad teeth occurred only in a few individuals. Bleeding gums were also quite rare.

The symptom of "constipation" was probably a result of reduced food intake rather than true stonic or spastic changes in bowel function.

Ulcer symptoms occurred irregularly and for the most part appeared first or recurred noticeably in the stress of combat. In no instance of those interviewed had an ulcer been definitely diagnosed and most subjects had been studied carefully in hospitals.

Cough, precordial pain, dyspnea, palpitation, joint pains, and edema were reported by an insignificant number.

An attempt was made to find out how many subjects had suffered from symptoms of heat intolerance. No instance of heat stroke occurred though syncope and heat exhaustion had taken place, particularly in combat. A tendency to fall out repeatedly in marches or in any protracted hard work was noted in a significant number and was related to both heat load and work load as well as to a low state of training, poor morale and possible to lack of acclimatization.

The specific diseases and infections followed trends well established in epidemiology although many diseases had been acquired or had run their course in other places than the area in which the subjects were studied. Dysentery was by far the commonest infection but in only a rare case did it obviously interfere with nutrition. The rarity of malaria testifies to the efficiency of the anti-malaria program.

Skin diseases are very prevalent in the moist tropics, and heat rashes, epidermophytosis and "jungle rot" were very prevalent as seen in Table 8.

The use of atabrine, salt and vitamins varied from place to place. Vitamins in particular were taken by some groups of subjects and omitted by others. No evidence was found to indicate that health, physical fitness or morale were affected favorably or adversely by routine or sporadic use of vitamins. There was regularly a larger urinary excretion where they had been used in the recent past.

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TABLE 7

Pre-Army History	Hawaii	Guadal-canal	Guam	Iwo Jima	POA*	Okinawa Casualties
					Average Excluding Okinawa	
Pulmonary Disease	0	0	0	0	0	4
Skin Diseases	0	0	2	0	1	0
Allergic Disease	2	0	2	0	1	2
Chronic Sinusitis	0	0	2	0	1	4
Cardiovascular Disease	0	0	2	0	1	0
Infectious Hepatitis	0	0	0	6	2	0
Acne	0	0	5	0	3	0
<u>Overseas History</u>						
Anorexia	0	14	5	16	9	6
Bad Teeth	0	6	5	6	5	4
Bleeding Gums	0	4	2	0	2	4
Recent Weight Loss	0	16	23	55	30	65
Constipation	0	0	8	10	7	2
Ulcer symptoms	0	4	8	0	5	10
Irregular eating habits	0	8	8	0	5	0
Cough	4	0	0	2	1	0
Precordial pain	2	6	5	0	4	4
Dyspnea	0	0	0	4	1	0
Palpitation	0	0	0	2	1	0
Edema (on prolonged standing)	0	0	5	2	3	0
Heat Intolerance	0	12	8	6	8	14
Falling out on Marches	0	2	8	12	8	4
Malaria	0	8	0	6	3	0
Dengue	0	8	13	8	10	24
Dysentery	2	14	33	12	23	35
Hepatitis	0	4	0	0	1	4
Fever, unknown origin	0	4	0	4	2	0
Heat Rash	4	40	38	53	42	40
Epidermophytosis	34	56	63	71	63	69
Headaches	14	6	8	16	10	4
Current Atabrine	2	22	0	0	3	69
Previous Atabrine	0	72	13	8	19	10
Current Vitamins	2	6	0	10	4	24
Previous Vitamins	10	26	13	14	17	34
Use of Salt Tablets	0	54	45	55	37	50

* Weighted According to Troop Strength.

Morale is relatively intangible and does not admit of exact comparison. Our impression was that morale improved with activity and hard work and was lower in inactive garrisons than in forward areas. The point system with its tangible regulations rather than the previous systems should improve that aspect of morale. From the point of view of the soldier, food is still a prime factor in good morale and improvements in rations are all highly appreciated. It is significant that soldiers "gripe" about food and mess while most naval personnel and particularly submarine crews rarely do. Better food supply is not alone the reason. Improper preparation and inadequate service of Army food is very wide spread.

F. Physical Examination.

Since there is no agreement among specialists on the meaning of borderline symptoms and very early signs of nutritional deficiency states, nor is it clear what criteria separate optimal, good, borderline and an adequate nutrition in the various categories of physical findings, conservative judgment has been used in interpretation. The examination consisted almost entirely of inspection. Whatever subjective element existed was the same throughout because the examinations were done by one man. The same terminology and the same criteria were used as in the Colorado Rations Trials (Summer 1944), Army Medical Research Laboratory report on Project 30 dated 22 November 1944. Table 8 presents the findings in the Pacific Ocean Area, and Table 9 the statistical reliability of the clinical data.

For example, miliaria was found in 30% of the troops studied on Guam. The odds, therefore, are 19 to 1 that the incidence of miliaria in all troops on Guam at the time of the study was between 30% plus or minus 13% or between 17% and 43%.

Similarly, the column headed "POA Average" shows the maximum probable deviation of the weighted averages for the four islands from the average which would have been found had all troops been studied.

Results:

Eyes: In Table 8 the clinical data are listed in terms of percentage of subjects with positive findings. For comparison the results of the Colorado Ration Test are tabulated with the Pacific Ocean Area survey. The Colorado subjects had been subsisting on field ration A. Dryness and typical Bitot's spots were not found. Changes in opacity of the cornea occurred in islands where sand, coral or

ANNEX 5

TABLE 8

Clinical Findings Expressed as Percentage Positive in Subjects Examined

	Hawaii	Guadal-canal	Guam	Iwo Jima	ROA* Average Excluding Okinawa	Okinawa Casualties	Colorado Infantry
Eyes							
Dryness	0	0	0	0	0	0	0
Bitot's spots	0	0	0	0	0	0	0
Gross changes in opacity of sclera slight	0	0	32	12	20	18	60
Gross changes in opacity cornea	0	0	0	2	0.6	0	2
Gross changes in opacity of sclera moderate and severe	0	0	0	0	0	0	10
Gross conjunctivitis	24	34	43	64	47	42	46
slight	4	6	2	12	6	6	10
moderate and severe	2	6	2	6	4	12	10
Pterygia							
Lips and Mouth							
Angular fissure in absence of false teeth	0	0	0	0	0	0	0.3
Cheilosis	0	0	0	0	0	2	6
Clossitis	0	0	0	0	0	0	0.3
Stomatitis	0	0	0	0	0	0	0
Gingivitis slight	0	12	15	24	16	24	18
moderate and severe	0	2	0	0	0.3	4	0
Active acute inflammation of dental margin	8	2	0	0	1	2	16
Swelling of interdental papillae	4	6	0	16	6	8	**
Bleeding of gums	8	0	0	0	0.4	0	**
Oral hygiene good	50	40	50	24	41	14	44
fair	46	50	48	68	54	68	46
poor	4	10	2	8	5	18	10
Abnormal pigmentation of buccal mucosa	12	14	12	12	12	12	2

TABLE 8 (continued)

	Hawaii	Guadal-canal	Guam	Iwo Jima	POA* Average Excluding Okinawa	Okinawa Casualties	Colorado Infantry
<u>Skin</u>							
Follicular hyperkeratosis slight moderate & severe	4	2	5	0	3	0	2.5
Folliculitis	0	0	0	0	0	0	2
Lichen planus	0	0	0	0	0	0	**
Acneform eruption slight moderate & severe	4	6	8	0	5	4	**
Seborrheic dermatitis	0	0	7	2	4	4	18
Pellagrous dermatitis	10	4	0	0	2	0	3
Miliaria	0	0	0	0	0	0	**
Traumatic dermatitis	0	20	30	32	28	8	1
Dermatitis of fungus infection	0	0	0	0	0	0	**
Petechial hemorrhages	0	0	12	0	6	20	**
Purpura	0	0	0	0	0	0	0.2
							0
<u>Extremities</u>							0.3
Brittleness of nails	0	0	0	0	0	0	0
Grooving or pitting of nails	0	0	6	0	1	0	0.2
Spoonning of nails	2	6	0	0	0	0	0.2
Pigmentation	0	0	0	0	0	0	0.2
Epidermophytosis	16	50	20	14	22	30	0.2
Pes planus	2	28	2	6	7	2	0
							0
<u>Neuromuscular</u>							0.3
Muscular weakness	0	0	0	0	0	0	0
Knee jerks absent	2	0	0	0	0	0	0
Ankle jerks absent	0	0	0	0	0	0	0
Tenderness of belly of gastrocnemius	0	0	0	0	0	0	0
Nerve tenderness	0	0	0	0	0	0	0.3

TABLE 8 (continued)

	Hawaii	Guadalcanal	Guam	Two Jima	POA* Average Excluding Okinawa	Okinawa Casualties	Colorado Infantry
Vibratory sense loss on malleoli	0	0	0	0	0	0	0.2
Symmetrical muscular atrophy in extremities	0	0	0	0	0	0	0
Pretibial pitting edema	0	0	0	0	0	0	1
Pitting edema of feet	0	0	0	0	0	0	0
Pitting edema over sacrum	0	0	0	0	0	0	0.2
Romberg's sign	0	0	0	0	0	0	**

* Weighted according to troop strength.

** Not recorded.

TABLE 9

Statistical Reliability of Clinical Data

% Incidence of clinical finding	Approximate probable maximum deviation (%) from true incidence	Average POA*
10	8.3	4.4
20	11.2	5.8
30	12.7	6.7
40	13.6	7.2
50	13.9	7.3
60	13.6	7.2
70	12.7	6.7
80	11.2	5.8
90	8.3	4.4

*The odds are 19 to 1 that % incidences of various clinical findings in the sample of 50 men studied for any one island did not deviate more than the above amounts from the % incidence which would have been found had all troops been studied.

For example, miliaria was found in 30% of the troops studied on Guam. The odds, therefore, are 19 to 1 that the incidence of miliaria in all troops on Guam at the time of the study was between 30% plus or minus 13% or between 17% and 43%.

Similarly, the column headed "POA Average" shows the maximum probable deviation of the weighted averages for the four islands from the average which would have been found had all troops been studied.

Results:

Eyes: In Table 8 the clinical data are listed in terms of percentage of subjects with positive findings. For comparison the results of the Colorado Ration Test are tabulated with the POA survey. The Colorado subjects had been subsisting on field ration A. Dryness and typical Bitot's spots were not found. Changes in opacity of the cornea occurred in islands where sand, coral or volcanic dust and glare were prevalent, and were notably absent in the garrisons of Hawaii and Guadalcanal. Conjunctival injection and inflammation were more common and more severe where local traumatic agents were encountered. Pterygia were somewhat less common than in the Colorado subjects. In summary, there was no definite indication, from physical examination of the eyes, that vitamin A or riboflavin were inadequate in the diets.

Lips and Mouth: A single instance of unilateral cheilosia occurred in one subject from Okinawa who happened to have a high urinary excretion of riboflavin.

Gingivitis of the type commonly called "pyorrhea" appeared chiefly among those who had not had recent dental care. There was no instance of bleeding of the gums except on Hawaii though swelling and inflammation of the margins occurred in significant numbers everywhere except on Guam. The ascorbic acid intake on Guam was the highest of any islands studied.

Oral hygiene was worse in those recently out of combat.

Abnormal pigmentation of the buccal mucosa included two types of pigment; one was that diffuse or splotchy slate - colored pigment commonly seen in Negroes; the other was a type more or less confined to the anterior two-thirds of the hard palate in subjects who had been taking atabrine.

In summary, it is not known whether the lesions mentioned above were of nutritional origin.

Skin:

Follicular hyperkeratosis appeared in a few subjects in various garrisons but was strikingly less common than in the Colorado subjects. Infection of hair follicles was common on Iwo Jima but was not seen elsewhere. It was attributed to the ubiquitous volcanic ash. Acne and related disorders, usually somewhat different from typical adolescent acne occurred in a few subjects. Some hospital surgeons say that this lesion responds to vitamin C therapy. Seborrheic dermatitis also occurred in a few. There was no pellagrous dermatitis, and no skin changes of the type reported in endemic riboflavin deficiency were encountered. There were no purpurae, ecchymoses, or petechial hemorrhages. Miliaria was very common in the hot moist areas but had no apparent connection with nutritional status. The dermatitis of fungus infection included lesions of the hands, feet or elsewhere and was not typical athlete's foot but usually chronic ulcers. One case of diphtheritic ulcers and palsy was seen. Epidermophytosis was very common and had been the cause of many days in the hospital or on sick call.

There was no diagnostic evidence of vitamin deficiency from the dermatological point of view.

Neuro-muscular:

With the exception of one subject with absent knee jerks and another without ankle or knee jerks there were no abnormalities in the neurological examination.

Body Weight:

Average heights and weights are shown in Table 10. Their ratio may be used as a measure of calorie intake since a pronounced loss in weight results in an abnormally low value for the ratio in comparison with the value for garrison troops in U.S.A. In Pacific Ocean Area on the average this ratio was normal, and indicated that the average calorie intake had been adequate for some time. The Iwo Jima garrison averaged 5 pounds per man lighter for height than the Colorado infantrymen and all other islands as heavy or heavier. No subject on any of the islands was seriously underweight. Several were too heavy for maximum physical efficiency. It is of interest that although most of the Okinawa casualties thought they had lost 10 or more pounds during the campaign, at the time of examination they had on the average normal weights for height. It is possible that even a short period on hospital diet has repaired whatever calorie deficit they had before they were evacuated.

TABLE 10

Average Heights and Weights

Place	Height (in)	Weight (lbs)	Weight/Height
Hawaii	68.9	158	2.29
Guadalcanal	68.8	155	2.25
Guam	67.8	154	2.27
Iwo Jima	69.1	150	2.17
Average POA* excluding Okinawa	68.4	153	2.24
Okinawa Casualties	69.4	155	2.23
Infantry Battalion, Col.	68.8	153	2.22

*Weighted according to troop strength.

Conclusions:

Aside from some evidence of calorie deficit, in combat troops no classical clinical nutritional deficiency syndromes were found. However, the following lesions; swollen gums, hyperkeratosis, atypical

furunculosis, and corneal lesions, were found which are attributed by some medical authorities to nutritional deficiency. In these instances nutritional deficiency cannot be unequivocally excluded.

G. Physical Fitness

The test used to obtain a measure of physical fitness was described in the introduction. It depends on the cooperation of the subject, his morale or will to work, his physiological condition and anatomical structure. It is not possible to dissociate these factors but if the score is good it may be assumed that all are in a satisfactory condition. Since there was uniformly good cooperation we believe that the scores on the test represent a reasonable approximation of the true state of fitness. The individual scores agreed well with the observer's impression of actual fitness.

Distribution of scores and means are given in Tables 11 and 12 and are compared with Colorado Infantrymen. The lowest scores were made on Hawaii and Guadalcanal and the highest in Iwo Jima. Except for Hawaii and Guadalcanal the scores were very close to those made by subjects in Colorado and may be interpreted as perfectly normal for such troops.

From the physical fitness test it is concluded that on the average there was no defect in performance which could be attributed solely to faulty nutrition. In general scores were better where work and training were vigorous and favored good physical condition; while sedentary troops and those in less active areas had worse scores.

Table 11

Average Step Test Scores

Place	Mean Score
Hawaii	55
Guadalcanal	57
Guam	70
Iwo Jima	76
Average POA*	69*
Infantry Battalion, Colorado	71

*Weighted according to troop strength.

TABLE 12

Distribution of Physical Fitness Test Scores

	Hawaii	Guadalcanal	Guam	Iwo Jima	POA*	Col. Inf.	
20-25	6	4	0	0	1	0	Poor
30-35	18	16	2	2	5	2	
40-45	20	12	10	0	8	7	
50-55	14	20	10	7	11	8	Average
60-65	14	20	13	11	13	12	
70-75	16	18	28	39	29	47	
80-85	4	8	33	14	22	18	
90-95	8	2	2	27	10	5	
100-105	0	0	0	0	0	1	Good
110-115	0	0	0	0	0	0	
120-125	0	0	2	0	1	0	
Mean	55	57	70	76	69	71	

*Weighted according to troop strength.

H. Biochemistry

Comparison of biochemical results from one island to another will be found in Tables 14 and 13 and the statistical significance of the results is shown in Table 15. The interpretation of results has been discussed in the introduction, and the statements below are based on such interpretation.

Water Balance: As judged by hemoglobin and plasma protein levels, water balance was adequate in all subjects. There were so excessively high levels of hemoglobin or plasma protein to suggest dehydration.

Salt Balance: As judged by urinary chloride, salt balance was excellent everywhere. Only one subject was found to have low levels.

Calorie Balance: As judged by urinary acetone bodies, severe acute calorie deficits were not encountered. This method will not measure prolonged moderate calorie deficits. In only two specimens (one on Guadalcanal and one on Iwo Jima) were positive tests obtained for acetone bodies.

Hematopoietic Factors: As judged by hemoglobin levels the intake of hematopoietic factors had been adequate. There were no subjects with hypohemoglobinemia although the average level for the Okinawa casualties was slightly lower than anywhere else, and the average level on Hawaii for unexplained reasons was higher.

Protein: As judged by plasma protein levels, protein intake was adequate. No subject was found to have a pathologically low plasma protein, and the averages throughout the Pacific Ocean Area were substantially the same as in the United States of America.

Thiamine: As judged by urinary thiamine excretion, thiamine intake was adequate. Two (2) of all the subjects were placed in the "deficient range." The average excretion on all islands except Guam was lower than in Colorado, but not seriously so.

Riboflavin: No island except Okinawa differed significantly from the Colorado in average riboflavin excretion. A higher proportion of the men fell in the "deficient range" on Guam, Iwo Jima and Okinawa and fewer on Hawaii and Guadalcanal than was the case in Colorado.

Ascorbic Acid: As judged by urinary excretion, intake of ascorbic acid was satisfactory in most places. Very low values were encountered on Guadalcanal, where intake of ascorbic acid had been restricted by relative lack of fresh and canned fruits and by lack of palatable fortified beverages. High values were encountered on Guam, where the supply of fruit and of palatable beverages containing large amounts of ascorbic acid was good. Other places in Pacific Ocean Area fell between the extremes seen on Guadalcanal and on Guam, and the overall average for Pacific Ocean Area was 0.15 mgm/hr below that found in the United States where intake was very high.

TABLE 13

Average Biochemical Values for Blood and Urine

	Hawaii	Guadal- canal	Guam	Iwo Jima	PCA Avg*	Okin.	Col.
Hemoglobin (gm/100ml blood)	16.6	15.6	15.5	15.9	15.8	14.8	17.1
Protein (gm/100ml serum)	6.8	6.4	6.5	6.6	6.5	6.5	6.5
Fasting urinary Chloride (reading)	2 \pm	2 \pm	2 \pm	2 \pm	2 \pm	2	2 \pm
Fasting urinary ascorbic acid (mgm/hr.)	0.5	0.3	0.8	0.6	0.65	0.5	0.8
Thiamine (mcgm/hr.)	9	8	14	9	11.5	7	12
Fasting urinary riboflavin (mcmg/hr.)	26	27	24	23	24	21	26

*Weighted according to troop strength. Does not include Okinawa.

Biochemically "Deficient" subjects: The interpretation of blood and urinary levels will be found in "PROCEDURE." Table 15 summarizes the incidence of "deficiency" in Pacific Ocean Area. It will be seen that in comparison with well-trained, well-fed infantry troops in U.S.A., the subjects in Pacific Ocean Area were on the whole satisfactory with respect to hemoglobin, serum protein, chloride, and thiamine. The average for ascorbic acid "deficiency" was the same in Pacific Ocean Area and U.S.A., although on Guadalcanal there was a high percentage of unsaturated individuals. The average for riboflavin "deficiency" was significantly higher in Pacific Ocean Area than in U.S.A., Guam, Iwo Jima, and Okinawa contributing all of the "deficient" subjects.

TABLE 14

Measurement	Hawaii	Guadal-canal	Guam	Iwo Jima	POA* Avg	Okin Casl	Colo Inf
Hemoglobin	0	0	0	0	0	0	0
Serum Protein	0	0	0	0	0	0	0
Urinary Chloride	0	2	0	0	0.3	0	3
Fasting urinary ascorbic acid	2	45	0	5	8	8	7
Fasting urinary thiamine	0	2	2	2	2	0	0.2
Fasting urinary riboflavin	0	0	8	9	7	6	2

*Weighted according to troop strength, does not include Okinawa.

Statistical Reliability of Results.

From the values reported in Table 15 it will be seen that in all types of determination the maximum probable error resulting from sampling is of no significance for the present purposes.

ANNEX 5

TABLE 15

Statistical Reliability of Measurement Data

Probable Maximum Deviation from True Average*

Measurement	Hawaii	Guadal-canal	Guam	Iwo Jima	POA Avg	Okinawa Casualties
Height, inches	.79	.66	.80	.86	.49	.72
Weight, pounds	5.2	5.9	4.6	7.3	3.3	5.4
Step Test, score	4.5	4.8	4.8	3.7	2.8	
Age, years	1.6	1.8	1.2	1.7	0.7	0.6
Hemoglobin, gm/100 ml.	.37	.22	.26	.24	.15	.26
Plasma Protein, gm/100 ml.	.12	.11	.09	.10	.06	.13
Fasting Urinary ascorbic acid, mgm/hr	.04	.10	.12	.12	.07	.06
Fasting Urinary Thiamine, mcgm/hr	0.9	1.9	2.8	3.1	1.7	1.3
Fasting Urinary Riboflavin, mcgm/hr	3.1	2.5	4.2	4.4	2.6	2.0
Fasting Urinary Chloride, reading	.20	.25	.22	.12	.12	.21

*The odds are 19 to 1 that the averages found for the sample of 50 men on a particular island did not deviate more than the above amounts from the averages which would have been found had all troops on the island been studied.

For example, the average plasma protein for the troops studied on Iwo Jima was 6.6 gm per 100 ml. From the above table it may therefore be calculated that the odds are 19 to 1 that the average plasma protein of all troops on Iwo Jima at the time of the study was between 6.5 and 6.7 gm per 100 ml.

Similarly, the odds are 19 to 1 that the combined averages for all troops on Hawaii, Guadalcanal, Guam, and Iwo Jima did not deviate from the averages reported in this study by more than the amounts listed under column headed "POA average."

ANNEX 5

A: Master Form

Date: _____

Place: _____

Name: _____

ASN: _____

Rank: _____

Organization: _____

Height: _____ Weight: _____ Age: _____

State of longest residence in U. S.: _____

Main civilian occupation: _____

Total time in the army (months): _____

OVERSEAS HISTORY

Dates	Place	Job

B. BIOCHEMICAL DATA

Date _____

Place _____
(1-2)

Name _____ ASN _____ Rank _____
(3-5)

Organization _____

Blood and Serum

Hemoglobin, gm/100ml. _____ 6-8
Serum protein, gm/100ml. _____ 9-10
Ascorbic acid, mg/100ml. _____ 11-12
Carotene, I.U./100ml. _____ 13-16
Vitamin A, I.U./100ml. _____ 17-20

Fasting Urine

Ascorbic Acid, mg/hr. _____ 21-22
Thiamine, mcg/hr. _____ 23-25
Riboflavin, mcg/hr. _____ 26-28
N'methylnicotinamide, mg/hr. _____ 29-31

Tolerance Tests (Urinary excretion in 4 hours after oral test dose of 5 mg thiamine hydro chloride, 5 mg riboflavin, 50 mg nicotinamide, and 500 mg ascorbic acid)

Ascorbic acid, mg _____ 32-34
Thiamine, mcg _____ 35-38
Riboflavin, mcg _____ 39-42
N'methylnicotinamide, mg _____ 43-45

Remarks:

Qualitative Urinalysis

Chloride	46
Acetonebodies	47
N.P.P.S.	48
Acidity	49
Sp. gravity	50-51
Albumen	52

Microscopic Examination

Urine	
Casts	53-54
Red cells	55-56
White cells	57-58
Organisms	59

Blood
Erythrocyte _____ 60-61

Reticulocyte count _____ 62

Leucocyte count _____ 63-67

Differential count:
Poly _____ 68-69

Large lymph _____ 70-71

Small lymph _____ 72-73

Mono. _____ 74-75

Eos. _____ 76-77

Baso. _____ 78-79

C: Overseas Ration History

Date: _____

Place: _____

Name: _____

ASN: _____

Rank: _____

Organization: _____

Dates	Ration	Comments*

*1. Foods not eaten
2. Supplement by P.X.
3. Supplement by Red Cross

D: Medical History

Date: _____

Place: _____

Name: _____

ASN: _____

Rank: _____

Organization: _____

Pre-Army:

Childhood Diseases:

Chronic Diseases: Pulmonary _____ Skin _____ Allergic _____
Cardiovascular _____ Other _____

G-I: Appetite

Teeth

Gums

Bowl habits:

Weight: Average _____ best _____ worst _____

Jaundice

present _____

C-R: Cough

Precordial pain:

Dyspnea:

Palpitation:

Edema

Fatigue:

Falling out in marches:

Heat intolerance:

Overall efficiency:

Diseases: Malaria:

first attack:

relapses:

Dengue:

Dysentery:

Fever U.O.:

Other:

Skin:

Prickley heat:

Athletes foot:

Lichen planus:

Sores:

Eating habits:

Other:

N-P: Morale:

Gripes:

Mental status:

Headaches:

Effort syndrome:

Joints:

Muscles:

Eyes:

Hospitalization:

Wounds:

Healing:

Medication:

Atabrine:

duration:

dosage:

therapy:

Quinine:

Vitamins:

Salt:

Toxic agents:

Duration of exposure:

Amount:

DDT:

Microclene:

CWS:

Clothing:

Boots:

Ratings: Officers:

Non-coms:

E: Physical Examination

Date: _____

Place: _____ (1 - 2)

Name: _____

ASN: _____ (3 - 5)

Rank: _____

Organization: _____

EYES:

- (6) _____ No abnormalities
- (7) _____ Dryness (8) _____ Bitot's spots.
- (9) _____ Gross changes in opacity of sclera 1. _____ slight; 2. _____ moderate; 3. _____ severe.
- (10) _____ Gross changes in opacity cornea (11) _____ old corneal injury.
- (12) _____ Gross conjunctivitis 1. _____ slight; 2. _____ moderate; 3. _____ severe _____.
- (13) _____ Pterygia
- (14) _____ Pingueculae
- (15) _____ Not examined

REMARKS:

LIPS AND MOUTH:

- (16) _____ No abnormality
- (17) _____ Angular fissure in absence of false teeth.
- (18) _____ Cheilosis
- (19) _____ Glossitis 1. _____ slight; 2. _____ moderate; 3. _____ severe.
- (20) _____ Stomatitis 1. _____ slight; 2. _____ moderate; 3. _____ severe.
- (21) _____ Gingivitis 1. _____ slight; 2. _____ moderate; 3. _____ severe.
- (22) _____ Active acute inflammation of dental margin 1. _____ slight; 2. _____ moderate; 3. _____ severe.
- (23) _____ Swelling of interdental papillae
- (24) _____ Bleeding of gums, either spontaneous or on slight trauma.
- (25) _____ Number of significant cavities
- (26) _____ 1. Oral hygiene good _____ 2. fair _____ 3. poor _____
- (27) _____ Abnormal pigmentation of buccal mucosa.
If present _____ location and _____ nature
- (28) _____ Not examined.

REMARKS:

SKIN:

(29) _____ No abnormality
(30) _____ Follicular hyperkeratosis 1. _____ slight; 2. _____
moderate; 3. _____ severe.
4. If present, area _____.
5. _____ Lichen planus.
(31) _____ Acneiform eruption 1. _____ slight; 2. _____ moderate;
3. _____ severe. If present, area _____.
(32) _____ Seborrheic dermatitis. If present, area _____.
(33) _____ Pellagrous dermatitis. 1. _____ acute; 2. _____ chronic;
3. _____ slight; 4. _____ moderate; 5. _____ severe.
If present, area _____.
(34) _____ Miliaria. 1. _____ slight; 2. _____ moderate; 3. _____
severe. If present, area _____.
(35) _____ Traumatic dermatitis. 1. _____ slight; 2. _____ moderate;
3. _____ severe. If present, area _____.
(36) _____ Dermatitis of fungus infection. 1. _____ slight; 2. _____
moderate; 3. _____ severe. If present, nature _____
and area _____.
(37) _____ Petechial hemorrhages. If present, area _____.
(38) _____ Purpura. If present, area _____.
(39) _____ Not examined.

REMARKS:

Extremities:

(40) _____ No abnormality
(41) _____ Brittleness of nails
(42) _____ Grooving or pitting of nails
(43) _____ Spooning
(44) _____ Pigmentation. If present _____ location
and _____ area.
(45) _____ Palmar erythema (46) _____ vascular spiders
(47) _____ Epidermophytosis of hands or feet. If present _____
location. 1. _____ mild; 2. _____ moderate;
3. _____ severe.
(48) _____ Pes planus. If present 1. _____ mild; 2. _____ moderate;
3. _____ severe. 4. _____ Transverse arch; 5. _____ longit-
udinal arch.
(49) _____ Not examined.

REMARKS:

NEUROMUSCULAR:

- (50) No abnormality
- (51) Muscular weakness (step test)
- (52) Knee jerks absent 1. rt; 2. lt; 3. both.
- (53) Ankle jerks absent 1. rt; 2. lt; 3. both.
- (54) Tenderness of belly of gastrocnemius.
- (55) Nerve tenderness. If present, _____ location.
- (56) Vibratory sense lost on malleoli 1. rt; _____ lt.
- (57) Symmetrical muscular atrophy in extremities.
- (58) Pretibial pitting edema
- (59) Pitting edema of feet
- (60) Pitting edema of sacrum.
- (61) Romberg's sign
- (62) Not examined

REMARKS:

PHOTOGRAPHS:

OTHER SYSTEMS: Cardiovascular, respiratory, abdomen, others.

PHYSICAL FITNESS:

- (63-65) Duration (Mins. and Secs.) _____.
- (66-68) Pulse (1 to 1 1/2 Mins. after) _____.
- (69-71) Score _____.

H: Summary of Positive Findings and Diagnosis

Date _____

Place _____.

Name _____

ASN _____.

Rank _____

Organization _____.

Dietary Interview:

Clothing, Boots, and Miscellaneous:

Medical History:

Physical Examination:

Biochemical Observations:

Diagnoses:

30 July 1945

MEMORANDUM FOR: The Surgeon General.

THRU: Chief, Preventive Medicine Service.

SUBJECT: Report of Overseas Temporary Duty Assignment.

1. Pursuant of War Department letter orders AGPO-A 201-Ashe, Wm. F., Subject: Shipment-OO Fort Shafter AA, dated 15 June 1945, this officer left Washington on 19 June 1945 and returned 18 July 1945 during which period he visited Hq., AFMIDPAC, Fort Shafter; Hq., AFPAC; Hq., AFWESPAC; and Hq., PHIBSEC, Manila, and Base Hqs., Leyte, Biak and Hollandia. All travel was by commercial and ATC aeroplane. The purpose of this temporary duty was to replace Major Wm. B. Bean on the nutrition survey team studying the nutritional state of troops in the Pacific Ocean Area, to carryout special studies on atypical Lichen Planus cases and to initiate studies on anemia among nurses.

2. A detailed report of the findings of the nutrition survey team on Hawaii, Guam, Saipan, Iwo Jima, Luzon, Biak, Hollandia and Guadalcanal is being prepared and will be submitted in the near future. In general, the nutritional state of the troops studies on all of these bases was excellent with best nutrition found on Guam and poorest on Guadalcanal. No classical nutritional deficiency disease was encountered. A small but significant number of men on certain of the islands showed definite evidence of suboptimal nutrition.

3. A special study was made of the blood Vitamin A level in a few cases of atypical Lichen Planus and a study of anemia in nurses was initiated. A detailed report of these studies will also appear with the complete report of the survey team.

a. The Lichen Planus study was not wholly satisfactory for three reasons: first, cases of atypical Lichen Planus are being evacuated to the states by air in a matter of days; second, there are very few cases developing in the theater at present; and third, the method for measuring Vitamin A in the blood proved unsatisfactory for use in the tropics during rainy season. It is an anhydrous reaction and it was not possible to keep all chemicals as dry as desired. The data accumulated has value in that the levels

found in cases and controls did not differ significantly but the absolute values are open to serious question. It is believed that a more reliable study could be made at the ports of debarkation on the west coast.

b. A number of the hospitals in the New Guinea area which had discovered anemia in their nurses were closed and enroute either to Luzon or islands further north. In many instances the nurses had gone home on rotation or leave or were scattered to several new stations. This was true of the 105th, 104th, 54th and four others previously at Hollandia and Finchaven. The 27th General still on Hollandia had recently checked their nurses and had no anemia. The same was true of the 132nd on Biak and 126th on Leyte. The 9th General on Biak, however, had data on their personnel and expected to be able to hold them for at least a month. The chief of the laboratory service, Lt. Colonel Lippard, has begun an exhaustive study of the nature of this disorder and the author left with him several pure vitamin compounds to try as therapeutic agents. The three hospitals operating in Manila said they had data to show that there was no significant anemia among their nurse personnel. This observer concurs with the opinion of the theater Medical Consultant, Colonel Hal Thomas, that at present there is no significant anemia problem among nurses in that theater.

4. In the course of the above mentioned work, it was possible to make a few observations in regard to patient feeding in the 57th General Hospital on Saipan, the 80th, 49th and 120th General Hospitals in Manila, the 126th General on Leyte, and the 9th and 132nd General Hospitals on Biak and the 27th General Hospital at Hollandia. The other General Hospitals in the SWPA had been closed and were in the process of moving to Luzon.

a. The food available to the General Hospitals has improved remarkably in the last three months and may now be considered excellent. The most outstanding deficiencies are inadequate machinery for making ice cream and for reconstituting dried milk. Meat, butter, poultry, fresh fruit and vegetables are available in fairly adequate quantities. Fresh eggs are available at some bases, but not at others. There is no appreciable waste of fresh food.

b. Patient mess operation in approximately half the hospitals inspected was good and supplied palatable hot food to patients in an acceptable state and food consumption was good. In the others, with essentially the same food supplies, defects in mess operation and food service technique frequently resulted

in the patients getting unpalatable and unacceptable food which was poorly consumed. These defects were discussed with the Commanding Officers involved and with the Base Nutrition and Catering Officers. Efforts are being made to improve them. It is extremely difficult to serve adequate hot food in acceptable and attractive form to non-ambulatory patients in any of the hospitals because of an inadequate supply of properly insulated food carts or food containers. This difficulty is also magnified by lack of personnel to do the work. The general hospitals in this theater must supply personnel out of their own tables of organization for construction, waste disposal, mail, finance and records of the detachment and patients, guard, laundry, etc. This personnel is not supplied to them by the theater overhead as prescribed. As a result, the detachment personnel available to care for patients is frequently only about half the number planned and commonly the hospitals have from 50 percent to 100 percent more patients than their prescribed bed strength calls for. Patient feeding frequently suffers.

5. This officer also was afforded the privilege of conferring with many of the Nutrition Officers, Sn.C. in both AFWESPACE and AFMIDPAC.

a. Lt Charles Buss is Theater Nutrition Chief under Lt. Colonel Ward in Armed Forces, Middle Pacific. He is an excellent man, well thought of by Colonel Ward, by Deputy Surgeon, Colonel Welch, and by The Surgeon, Brigadier General Willis. He has recently published a theater directive on nutrition similar in scope to AR 40-250 which will improve the supervision given to Nutrition in that area. He has five (5) Nutrition Officers in the area as follows:

1. Captain Ruben Engel - Preventive Medicine School, APO 331
2. Lt. Glen Hans Beck - Espiritus Santo
3. Lt. Sherman Davis - Guadalcanal
4. Lt. Robert Nance - New Caledonia
5. Lt. Robert Clegg - South Pacific, New Caledonia

b. It is the opinion of Lt. Colonel Ward and Lt. Buss, concurred in by this officer, that the number of Nutrition Officers in this theater is inadequate and that their present distribution is not optimal. A recommendation was made to the Commanding General,

Armed Forces, Middle Pacific, thru The Surgeon, concurred in by Lt. Colonel Ward and Lt. Buss, to increase their number in accord with the policy given in AR 40-200 for the purpose of better carrying out The Surgeon's responsibilities as described in AG letter 430.2 MODM, 12 January 1942 and AR 40-250. Men are available in the Zone of Interior to meet any reasonable request which may result therefrom.

c. Major William Bergren has recently been made Theater Nutrition Office vice Lt. Colonel Owen under Colonel Bass, Preventive Medicine Service, Office of The Surgeon, Armed Forces, Western Pacific. This organization is presently headed by Brigadier General Denit, but a new surgeon is to be appointed and a complete reorganization of the Surgeon's office appears to be imminent. There are 26 additional Nutrition Officers, Sanitary Corps, in this theater distributed as follows:

1. Lt. Colonel Hubert W. Marlow - Luzon - Catering
2. Captain LeMar F. Remmert - Luzon - Catering
3. Captain Eliot F. Beach - Luzon - Laboratory
4. Major John W. Hesen - Luzon - Medical Administration
5. 1st Lt. Oscar Burr Ross - Luzon - Nutrition
6. Captain John R. Kurtz - Luzon -
6th Army - Nutrition
7. Captain Sam L. Hansard - Luzon - Nutrition
8. Captain Charles E. Bode - Luzon - Nutrition
9. 1st Lt. Joseph A. Weybrew - Luzon - Nutrition
10. Captain Maurice P. Vannoy - Luzon - G-3 Inspection
11. 2nd Lt. Fred A. Draeseke - Luzon - Nutrition
12. Captain Arnold G. Ware - Luzon - Nutrition
13. 1st Lt. Ralph E. Guerrant - Cebu - Nutrition
14. 1st Lt. Irvin J. Belasco - Biak - Nutrition
15. 1st Lt. Robert Scott Allen - Leyte - Nutrition
16. 1st Lt. Edward J. Thacker - Base R - Nutrition
17. Captain Carl O. Clagget - Hq. 5th
AAF - Nutrition
18. Captain Raymond A.
Schroeder - 308th
Bomb Wing - Nutrition
19. Captain William J. Shannon - 309th Bomb
Wing - Nutrition
20. Captain Howard G. Dalton - 310th
Bomb Wing - Nutrition
21. 1st Lt. Charles H. Adams - 4th AFSAC - Nutrition
22. Captain Kenneth P.
McConnell - 13th AAF - Nutrition

23. 1st Lt. Oscar N. Miller - 13th
Gen. Hosp. - Nutrition
24. 1st Lt. Robert E. Feeney - - Nutrition
25. 1st Lt. Donald J. Greene - 14th AAF - Nutrition
26. 1st Lt. Willard L. Langhus - Base M - Nutrition

d. Two of the Nutrition Officers who are not doing Nutrition work under their Surgeons are nevertheless actively and effectively engaged in catering (Food Service) activities of the theater which contribute to better nutrition and are excellent examples of the type of cooperation between the Medical Department and the Quartermaster Corps which is essential to a well-rounded feeding program.

e. While it is believed that much reorganization is needed for Nutrition Officers in this theater, the situation is changing so rapidly in AFPAC and AFWESPAc that it was believed unwise to make any definite recommendations to the theater at this time. This matter was discussed at length with General Denit, Colonel Dart and Colonel Bass who concurred in the above opinion. Matters of general policy were discussed with Major Bergren who is presently developing a more adequate nutrition program. Duties were discussed with the individual officers at all bases visited.

f. When the new Armed Forces, Western Pacific, Surgeon is appointed a thorough discussion with him of nutrition problems in this theater is indicated. Whatever program is inaugurated must be thoroughly coordinated with the presently developing Quartermaster Catering (Food Service) program. This matter was discussed with Major Bergren and he was given all available information on the proper functions of The Quartermaster and The Surgeon in troop feeding as recently worked out here in the War Department.

g. There appears to be an important use for Nutrition Officers in General Hospitals in this theater and for the most part their services are being used. Brigadier General Denit asked me to convey to General Simmons and to Colonel Youmans the message that he will look favorable upon a specific offer from The Surgeon General's Office for a team of nutrition specialists on temporary duty to develop and implement an adequate nutrition program in hospitals. It is the opinion of this officer that such a team will be most effective about three (3) months from now when the new Medical Center at Fort McKinley is more fully in operation.

h. In discussing hospital nutrition problems, it was this officer's privilege to meet many of the dietitians. These women are doing an excellent job under adverse conditions. Their morale is not optimal largely because they felt that promotions have been less frequent than in comparable installations in the states.

i. It is suggested that morale of all Medical Department personnel in this theater would be much improved if a definite rotation policy was made known and adhered to. Professional personnel are not against staying any necessary length of time, but they would like to have a more definite idea of how long that may be.

Respectfully submitted,

s/ Wm. F. Ashe, Jr.

WM. F. ASHE, JR.
Major, Medical Corps
Assistant Director, Nutrition
Division

APPROVED:

s/ John B. Youmans

JOHN B. YOUNMANS
Colonel, Medical Corps
Director, Nutrition Division

ANNEX 6

HEADQUARTERS UNITED STATES ARMY FORCES, PACIFIC OCEAN AREAS
OFFICE OF THE COMMANDING GENERAL
APO 958

in reply refer to:

FIS 112.4 .

3 August 1944

SUBJECT: Augmentation of Ration.

TO : Commanding General, USAFPOA, APO 958

1. Authority is hereby granted to expend a sum not to exceed \$2,000.00 per month for a three month period from the appropriation "Contingencies of the Army" for the augmentation of the ration at Station Hospital Annex No. 1, APO 953.

2. These funds will be expended for the purchase of fresh milk and fruit juices for returned combat flyers on rest leave.

3. Attention is invited to par. 1 c, Letter, Headquarters United States Army Forces Central Pacific Area, 17 July 1944, File FIN-112.5, subject: "Disbursement of 'Contingencies of the Army' and 'Contingent Fund, Chief of Staff' Funds." The procedure outlined therein will be strictly adhered to.

By command of Lieutenant General RICHARDSON:

s/ J. F. Gilligan
t/ J. F. GILLIGAN
1st Lieut., A. G. D.,
Assistant Adjutant General.

A TRUE COPY:

s/ Charles D. Buss
CHARLES D. BUSS
1st Lt., SnC

ANNEX 7

HEADQUARTERS
ARMY AIR FORCES, PACIFIC OCEAN AREAS
APO 953

AFAAS /FR/jhn/82135
28 November 1944

SUBJECT: Augmentation of Ration.

TO : Commanding General, USAFPOA, APO 958.

1. Reference is made to letter your headquarters, subject as above, file FIS-112.4, copy attached.

2. It is requested that the augmentation of the ration as authorized in correspondence cited above be renewed to allow an expenditure of a sum not to exceed \$2,000.00 per month for a three-month period commencing 1 December 1944.

3. These funds will be expended for the purchase of fresh milk and fruit juices for returned combat flyers on rest leave. Pertinent directives governing procedural policies concerned with disbursement of these funds will be complied with.

For the Commanding General:

s/ A. B. Tenold
t/ A. B. TENOLD,
Major, AGD,
Adjutant General.

1 Incl:

Incl 1 - Ltr, Hq USAFPOA, 3 Aug 44,
sub: Augmentation of
Ration.

A TRUE COPY

s/ Charles D. Buss
CHARLES D. BUSS
1st Lt., SnC

ANNEX 8

RESTRICTED

HEADQUARTERS REST & RECREATION CENTER, AAFPOA
Office of the Surgeon
APO 953

E X T R A C T

31 May 1945

SUBJECT: Monthly Sanitation Report for May 1945.

TO : The Commanding Officer, Hqs. Rest & Recreation Center, AAFPOA, APO 953.

In compliance with the provisions of AR 40-275, CPA Circ 37, 25 Feb 44, Adm. O #1 (Index 206.20) CPBC, 16 Jan 45, the following Sanitary Report for the month of May 1945 is submitted.

* * * * *

(1) Food Supply and Preparation: The food supply is superior, being specially ordered and prepared for the benefit of combat crews attached to this organization for rest and recreation. Milk, fresh meats, and fresh fruits and vegetables are served daily. Preparation of the food is excellent.

* * * * *

4. Personal Hygiene:

a. The health of this command is good. Personnel attached for rest and recreation show an average weight gain of approximately 5 pounds during the ten day rest period.

* * * * *

s/ Ralph F. Hartman
t/ RALPH F. HARTMAN,
Captain, Medical Corps,
Flight Surgeon.

A TRUE EXTRACT COPY:

s/ Charles D. Buss
CHARLES D. BUSS
1st Lt, SnC

ANNEX 9

RESTRICTED

HEADQUARTERS REST & RECREATION CENTER, AAFPOA
Office of the Flight Surgeon
APO 953

E X T R A C T

31 May 1945

SUBJECT: Monthly Sanitation Report for May 1945.

TO : The Commanding Officer, Hqs. Rest & Recreation Center,
AAFPOA, APO 953.

In compliance with the provisions of AR 40-275, CPA Cir 37,
25 Feb 44, Adm. O #1 (Index 206.20) CPBC, 16 Jan 45, the following
Sanitary Report for the month of May 1945 is submitted.

* * * * *

7. Subjects not covered under other headings:

a. Nutrition of Troops: Excellent for permanent members
of this organization. The nutritional status of men returning from
the forward area for rest and recreation varies somewhat, but few
exceptions, improves during their stay.

* * * * *

s/ E. M. F. Weaver
t/ E. M. F. WEAVER,
Major, M. C.,
Flight Surgeon.

A TRUE EXTRACT COPY:

s/ Charles D. Buss
CHARLES D. BUSS
1st Lt, SNC

ANNEX 10

Headquarters United States Army Forces, Pacific Ocean Areas

Inter-Staff Routing Slip

For use in all inter-office correspondence. Separate each Memorandum
by a line and initial. Memorandum will preferably be typewritten.

RESTRICTED

EXTRACT

SUBJECT: Monthly Army Issues of Refrigerated Provisions, for month of June 1945.

Memo. No.	Date	From	To	Memorandum
*	*	*	*	*
2	13 July 1945	QM	G-4	<p>2. It is recommended that the issue of refrigerated subsistence supplies to POW's be discontinued.</p> <p>3. Attached for approval is a proposed messageform to the Central Pacific Base Command directing the action recommended in paragraph 2 above.</p> <p style="text-align: right;">a/ Clifford C. Wagner t/ CLIFFORD C. WAGNER Colonel QM Executive Officer.</p>
*	*	*	*	*
3	15 Jul 45	G-4	C/S	<p>1. In view of the present fresh meat shortage on the mainland with the consequent curtailment of the variety of foodstuffs furnished POW, it is believed that the Quartermaster's recommendation has merit.</p> <p>2. It is recommended that the policy of not furnishing POW refrigeration subsistence supplies be approved and extended to apply to the entire Middle Pacific.</p> <p style="text-align: right;">a/ Paul Steele t/ PAUL STEELE Colonel, G. S. C.</p> <p>CLASSIFICATION CHANGED</p> <p>* TO RESTRICTED*</p> <p>AUTH: WD Circ No. 4, 5 Jun. 1946</p> <p>DATE 20 Oct 1947</p> <p>CAPTAIN V. B. TAYLOR, PC Historical Division</p> <p style="text-align: center;">SECRET</p>
AM W/400	1945	1945	1945	

213

Page No.
OVER

Headquarters United States Army Forces, Pacific Ocean Areas

Inter-Staff Routing Slip

RESTRICTED

For use in all inter-office correspondence. Separate each Memorandum by a line and initial. Memorandum will preferably be typewritten.

EXTRACT

SUBJECT: Monthly Army Issues of Refrigerated Provisions, for Month of June 1945. (cont'd)

Memo. No.	Date	From	To	Memorandum
6	22 July 1945	DC/3	G-4	<p>2. CG desires that the paper be reviewed with the idea of reducing the amount of critical fresh foods supplied POW's and substituting other foods of equal nutritional value but which are more abundant and locally available. Consult Surgeon and JA.</p> <p>s/ W. S. Lawton t/ W. S. LAWTON Brigadier Gen, GSC DC of S</p>
9	30 Jul 1945	JA	G-4	<p>1. It is the opinion of this office that although POW's rations are nutritionally equal to rations provided for our troops in base camps, they may nevertheless not be equal in quality, and consequently violative of the Geneva Convention. If the food is wholesome and nutritionally equal, however, the interpretation of the War Department evidenced in AF Circular 191 is that it complies with the provisions of the Convention.</p> <p>2. The Commanding General is warranted, therefore, in having wholesome foods of equal nutritional value which are more abundant and locally available substituted for fresh foods in POW rations pursuant to Sect. IV, AF Circular 191, 29 May 1945.</p> <p>CLASSIFICATION CHANGED TO RESTRICTED AUTH: WD Circ No. 4, 29 May 1946</p> <p>s/ E. H. Smodgrass t/ E. H. SMODGRASS, Colonel, J. A. G. D., Staff Judge Advocate.</p> <p>DATE 20 JUL 1947 CAPTAIN V. B. TAYLOR, PC Historical Division</p>

Headquarters United States Army Forces, Pacific Ocean Areas

Inter-Staff Routing Slip

RESTRICTED

For use in all inter-office correspondence. Separate each Memorandum by a line and initial. Memorandum will preferably be typewritten.

EXTRACT

SUBJECT: Monthly Army Issues of Refrigerated Provisions, for Month of June 1945.

Memo. No.	Date	From	To	Memorandum
*	*	*	*	<p>*</p> <p>*</p> <p>*</p> <p>1. Sample copies of 15-day Italian and Oriental rations meeting the specified nutritional requirements are attached.</p> <p>a/ Thomas G. Ward t/ THOMAS G. WARD Lt Col, MC Assistant</p> <p><u>A TRUE EXTRACT COPY.</u></p> <p>Charles D. Buss. CHARLES D. BUSS 1st Lt, SnC</p> <p>CLASSIFICATION CHANGED RESTRICTED TO AUTH: WD Circ No. 4, 5 . . . 1946 DATE 20 Oct 1947 CAPTAIN V. B. TAYLOR, PC Historical Division</p>

HEADQUARTERS
13TH REPLACEMENT DEPOT
APO 969

SPECIAL ORDERS)

NUMBER 132)

12 May 1945

E X T R A C T

* * * *

9. 1st LT BUSS, CHARLES D 0529039 SnC atchd unsgd 534th Repl Co is placed on DS w/Hq USAFPOA (Surg O) APO 958 for a period of 30 days, upon compl of which, unless sooner rel'd, off will return to this depot under auth of this order. T by govt MT. Auth: Ltr Hq RTC APO 957 AG 210.3 subj "Atchmt of personnel for Tng"; par 17 AR 345-400.

* * * *

BY ORDER OF COLONEL ENTRINGER:

s/ C. W. Burleson
C. W. BURLESON
Major, AGD
Adj Gen

A TRUE EXTRACT COPY:

CHARLES D. BUSS
1st Lt, SnC

ANNEX 12

RESTRICTED

HEADQUARTERS UNITED STATES ARMY FORCES
PACIFIC OCEAN AREAS
APO 958

GENERAL ORDERS)

NO. 57)

2 June 1945

ORGANIZATION AND ASSIGNMENT OF UNIT

Effective 1 June 1945, the 6261st School of Preventive Medicine is organized in accordance with the table of distribution indicated below and upon organization is assigned to Headquarters, United States Army Forces, Pacific Ocean Areas:

<u>UNIT</u>	<u>T/D No.</u>	<u>AUTHORIZED STRENGTH</u>		
		<u>OFF</u>	<u>WO</u>	<u>EM</u>
6261st School of Preventive Medicine	No. 6261 (1 June 45)	14	0	28

BY COMMAND OF LIEUTENANT GENERAL RICHARDSON:

s/ Clark L. Ruffner
t/ CLARK L. RUFFNER
Major General, GSC
Chief of Staff

A TRUE COPY:

/s/ Charles D. Buss
CHARLES D. BUSS
1st Lt, SnC

ANNEX 13

RESTRICTED

TABLE OF DISTRIBUTION

HEADQUARTERS, US AFPO, APO 958

DESIGNATION: 6261st SCHOOL OF PREVENTIVE MEDICINE

No. 6261

Location: APO 958

Dated: 1 June 1945

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
BRANCH OF SERVICE	Technician Grade	Headquarters	MC	MAC	MC	MC	MC	SnC	SnC	SnC	SnC	SnC	SnC	SnC	SnC	
UNIT				Administration & Head		Epidemiology	Venerology			Parasitology	Malaria Engineering		Sanitary Engineering	Industrial Hygiene	Nutrition	TOTAL
2 COLONEL		1														1
3 Commandant (3005)	(1)															(1)
4 LT COLONEL			1								1					2
5 Epidemiologist (3119)		(1)														(1)
6 Sanitary Engineer (7960)																(1)
7 MAJOR					1	1			1							3
8 Malaria Engineer (7960)									(1)							(1)
9 Malariaologist (3138)							(1)									(1)
10 Venereologist (3155)						(1)										(1)
11 CAPTAIN		1				1				1		1				4
12 Executive (2120)	(1)															(1)
13 Biostatistician (3020)						(1)										(1)
14 Mammalogist (7960)											(1)					(1)
15 Nutritionist (3316)																(1)
16 FIRST LIEUTENANT								1	1			1				3
17 Entomologist (3315)								(1)								(1)
18 Industrial Hygiene Engineer (7960)																(1)
19 Parasitologist (3310)									(1)							(1)
20 SECOND LIEUTENANT		1														1
21 Administrator (2120)	(1)															(1)
22																
23 TOTAL COMMISSIONED	1	2	1	1	1	1	1	1	1	1	1	1	1	1	14	
24																
25 TECHNICAL SERGEANT, incl		1														1
26 Administrative NCO (502)	(1)															(1)
27 STAFF SERGEANT, incl		1	2													3
28 Clerk General (055)	(1)															(1)
29 Platoon (673)			(1)													(1)
30 Mess (824)			(1)													(1)
31 SERGEANT, incl		3	2			2					1					8
32 Artist, Poster (296)	4		(1)													(1)
33 Clerk Typist (405)		4	(2)													(2)
34 Cook (060)		4	(2)													(2)
35 Med Lab Tech (858)		4				(1)										(1)
36 Motor (014)			(1)													(1)
37 Statistical Clerk (055)				(1)												(1)
38 Stenographer (213)						(1)										(1)
39 CORPORAL, incl		1	1	1			2				1					6
40 Clerk Typist (405)		5		(1)												(1)
41 Cook (060)		5	(1)													(1)
42 Med Lab Tech (858)		5				(1)										(1)
43 Sanitary Tech (196)		5				(1)						(1)				(2)
44 Stenographer (213)		5	(1)													(1)
45 PRIVATE FIRST CLASS, incl		2				2					1					5
46 Artist, Poster (296)						(1)										(1)
47 Clerk General (055)			(1)													(1)
48 Cook's Helper (590)			(1)													(1)
49 Med Lab Tech (858)			(1)				(1)									(1)
50 Sanitary Tech (196)												(1)				(1)

RESTRICTED

RESTRICTED

TABLE OF DISTRIBUTION

RE S T R I C T E D

HEADQUARTERS, USAFPOA, APO 958

DESIGNATION: 6261st SCHOOL OF PREVENTIVE MEDICINE
Location: APO 958

No. 6261

Dated: 1 June 1945.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	BRANCH OF SERVICE	Technician	Grade	MC	MC	MC	MC	MC	SnC							
	UNIT	Headquarters	Administration	MAC	MAC	Epidemiology	Venerology	Biostatistics	MC							
51	PRIVATE, incl			2				1				1		1	1	5
52	Clerk Typist (405)													(1)	(1)	
53	Cook's Helper (590)			(1)												(1)
54	Sanitary Tech (196)							(1)				(1)				(2)
55	Truck Driver, 1. (345)			(1)												(1)
56																
57	TOTAL ENLISTED	3	10	3				7				4		1	28	
58																
59	AGGREGATE	4	12	4	1	1	8	1	1	1	1	1	5	1	2	42

BY COMMAND OF LIEUTENANT GENERAL RICHARDSON:

OFFICIAL:

CLARK L. RUFFNER
Major General, GSC
Chief of Staff*Ernest McMahon*ERNEST E. McMAHON
Colonel, AGD
Acting Adjutant General

DISTRIBUTION:

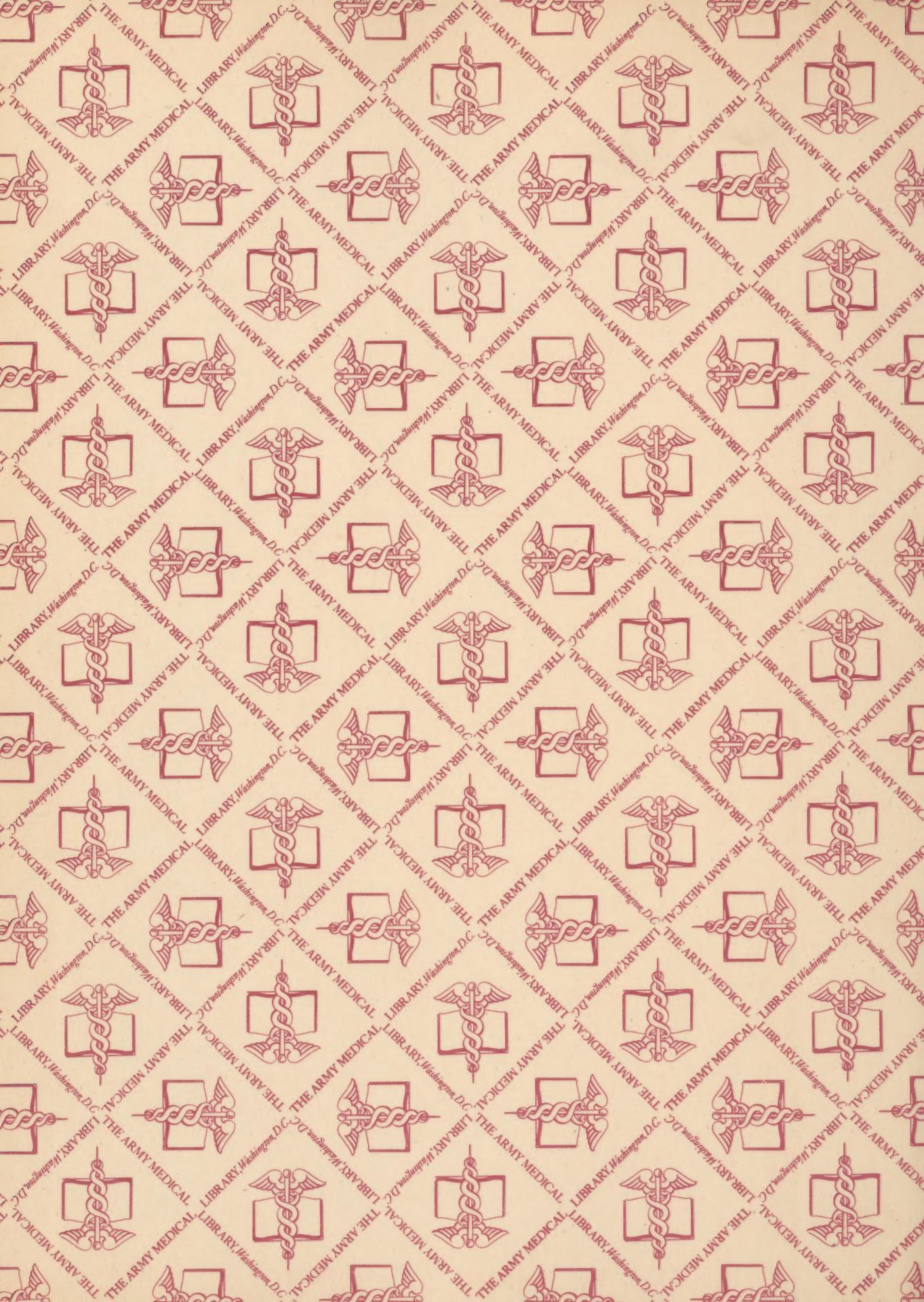
G-1 (2)
 G-3 (2)
 G-4 (4)
 Surg (2)
 MRU
 AG Misc (5)
 CO, 6261st School of Preventive Medicine (10)
 CG, CPBC, APO 958 (10)

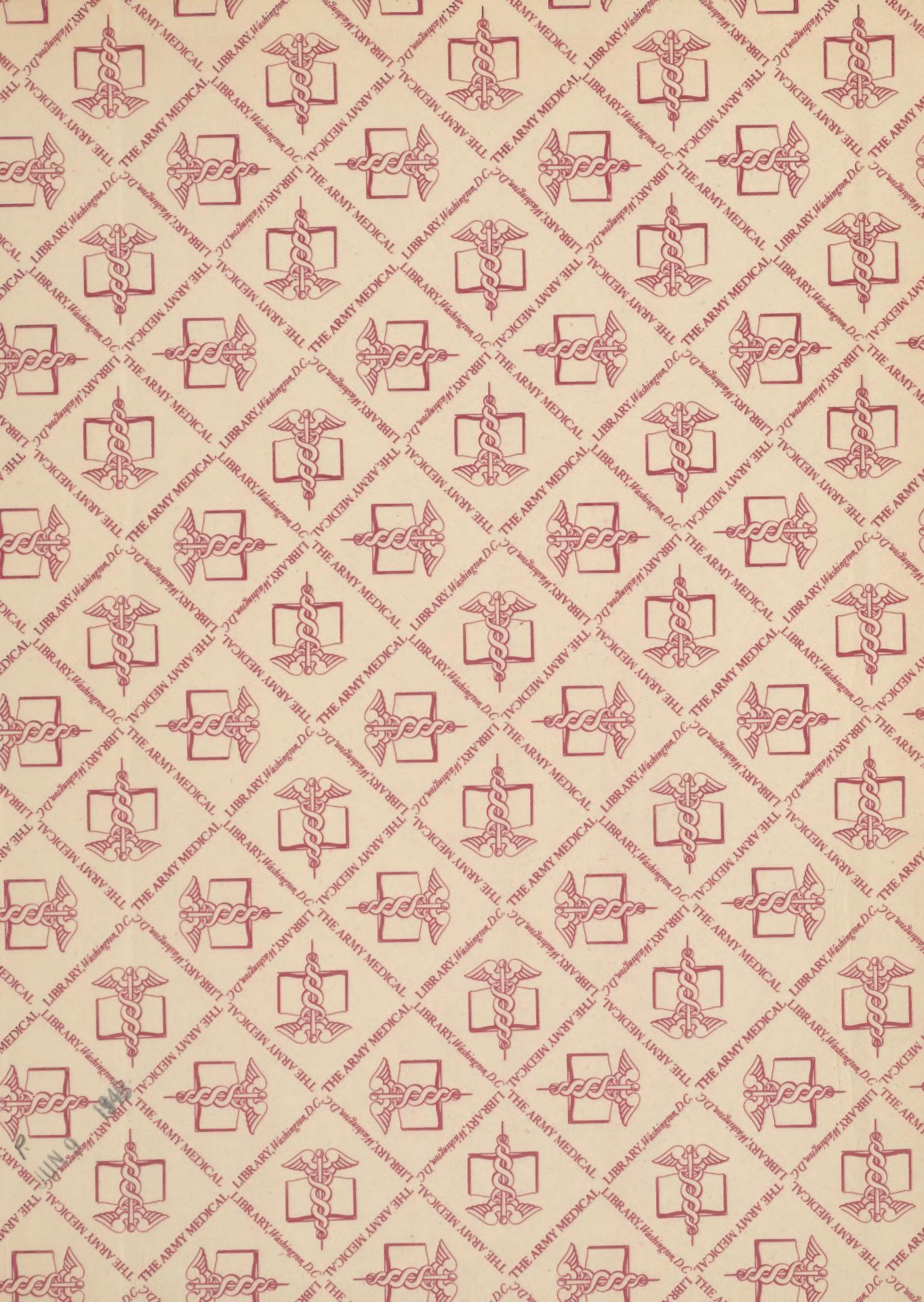
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